SEW EURODRIVE

Operating Instructions

MOVITRAC® LTP-B

Edition 12/2010

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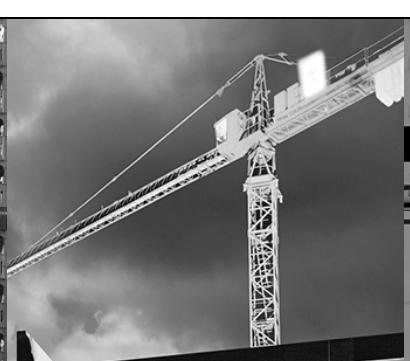

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1 Important Notes

1.1 About this documentation

The documentation is part of the product and contains important information about installation, startup, operation and service. The documentation is written for everyone installing, starting up or servicing this product.

The documentation must be accessible and legible. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the documentation carefully and understood it. If you are unclear about any of the information in this documentation, or if you require further information, contact SEW-EURODRIVE.

1.2 Structure of the safety notes

Unless the information in the documentation is adhered to, it will be impossible to ensure:

- Trouble-free operation
- Fulfillment of any rights to claim under guarantee

Consequently, read the operating instructions before you start working with the unit!

The operating instructions contain important information about servicing. Therefore, keep the operating instructions close to the unit.

1.2.1 Meaning of the signal words

The following table shows the grading and meaning of the signal words for safety notes, notes on potential risks of damage to property, and other notes.

Signal Word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent danger	Severe or fatal injuries
⚠ **WARNING**	Possible dangerous situation	Severe or fatal injuries
⚠ **CAUTION**	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the drive system or its environment
INFORMATION	Useful information or tip: Simplifies the handling of the drive system.	

1.2.2 Structure of the section safety notes

The section safety notes do not apply to a specific action, but to several actions pertaining to one subject. The pictograms used indicate either a general or a specific hazard.

This is the formal structure of a section safety note:

⚠ SIGNAL WORD

Nature and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

This is an example of a section safety note:

⚠ WARNING

Falling of suspended loads.

Severe or fatal injuries.

- Do not stand under the suspended load.
- Secure the danger zone.

1.2.3 Structure of the embedded safety notes

The embedded safety notes are directly integrated in the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

- ⚠**SIGNAL WORD** Nature and source of hazard.

  Possible consequence(s) if disregarded.

  – Measure(s) to prevent the hazard.

This is an example of an embedded safety note:

- ⚠**DANGER** Risk of crushing if the drive restarts unintentionally.

  Severe or fatal injuries.

  – De-energize the drive.

  – Secure the drive against unintended restart.

1.3 Rights to claim under limited warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the MOVITRAC® LTP-B documentation. Therefore, read the operating instructions before you start working with the unit.

Make sure that the documentation is available to persons responsible for the system and its operation as well as to persons who work independently on the unit. You must also ensure that the documentation is legible.

1.4 Exclusion of liability

You must comply with the information contained in this documentation to ensure safe operation and to achieve the specified product characteristics and performance requirements.

SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of the documentation. In such cases, any liability for defects is excluded.

1.5 Copyright notice

© 2010 – SEW-EURODRIVE. All rights reserved.

Copyright law prohibits the unauthorized duplication, modification, distribution, and use of this document, in whole or in part.

1.6 Product names and trademarks

The brands and product names contained within this publication are trademarks or registered trademarks of the titleholders.

2 Safety Notes

MOVITRAC® LTP-B drive inverters may not perform safety functions without higher-level safety systems.

Do not use MOVITRAC® LTP-B drive inverters for any safety functions in conjunction with hoist applications.

2.1 Preliminary information

The following safety notes predominantly refer to the use of frequency inverters. Additionally, when using drives with motors or gearmotors, observe the corresponding safety notes in the respective operating instructions.

Please also observe the supplementary safety notes in the individual sections of this publication.

2.2 General

During operation, frequency inverters can have live, bare parts according to their degree of protection.

Severe or fatal injuries.

- All work related to transportation, storage, setup / mounting, connection, startup, maintenance and repair may only be carried out by qualified personnel, in strict observance of:
  - The relevant detailed operating instructions
  - The warning and safety signs on the motor / gearmotor
  - All other project planning documents, operating instructions and wiring diagrams related to the drive
  - The specific regulations and requirements for the system
  - The national/regional regulations governing safety and the prevention of accidents
- Never install damaged products.
- Immediately report any damages to the shipping company.

Removing covers without authorization, improper use as well as incorrect installation or operation may result in severe injuries to persons or damage to property.

This document includes further information.

2.3 Target group

Any mechanical work may only be performed by adequately qualified personnel. Qualified personnel in this context are persons who are familiar with the setup, mechanical installation, trouble shooting and maintenance of this product. Further, they are qualified as follows:

- Training in mechanical engineering, e.g. as a mechanic or mechatronics technician (final examinations must have been passed).
- They are familiar with these operating instructions.

Any electronic work may only be performed by adequately qualified electricians. Qualified electricians in this context are persons who are familiar with the electronic installation, startup, trouble shooting and maintenance of this product. Further, they are qualified as follows:

- Training in electrical engineering, e.g. as an electrician or mechatronics technician (final examinations must have been passed).
- They are familiar with these operating instructions.

All work in further areas of transportation, storage, operation and waste disposal may only be carried out by persons who have been trained appropriately.

2.4 Designated use

Frequency inverters are components for controlling asynchronous AC motors. Frequency inverters are components intended for installation in electrical systems or machines. Never connect capacitive loads. Operation with capacitive loads results in over voltages and may destroy the unit.

The following standards apply, if the frequency inverters are marketed in the EU / EFTA:

- In case of installation in machines, startup of the drive inverters (meaning the start of proper use) is prohibited until it is determined that the machine meets the requirements stipulated in the EC Directive 2006/42/EC (machine directive); observe EN 60204.
- Startup (i.e. the start of designated use) is only permitted under observance of the EMC (2004/108/EC) directive.
- The frequency inverters comply with the requirements of the Low Voltage Directive 2006/95/EC. The harmonized standards of the EN 61800-5-1 / DIN VDE T105 series in connection with EN 60439-1/VDE 0660 part 500 and EN 60146 / VDE 0558 are applied to these frequency inverters.

Observe the technical data and the connection requirements specified on the nameplate and the operating instructions.

2.4.1 Safety functions

Frequency inverters from SEW-EURODRIVE must not perform any safety functions unless the inverters are subordinate to other safety systems.

Use higher-level safety systems to ensure protection of equipment and personnel.

2.4.2 Content of this publication

This publication contains conditions and amendments related to MOVITRAC® LTP-B in safety-oriented applications.

The system comprises a frequency inverter with asynchronous motor and safety-tested external disconnecting device.

2.5 Transport

Immediately upon receipt, inspect the shipment for any damage that may have occurred during transportation. Inform the shipping company immediately in the event of damage. It may be necessary to preclude startup.

2.6 Installation

- Never install or start up damaged products. Please submit a complaint to the transport company immediately in the event of damage.
- Installation, startup and service work on the unit may only be undertaken by trained personnel. The personnel must be trained in the relevant aspects of accident prevention and must comply with the regulations in force (e.g. EN 60204, VBG 4, DIN-VDE 0100/0113/0160).
- Follow the specific instructions during installation and startup of the motor and the brake.
- Ensure that preventive measures and protection devices correspond to the applicable regulations (e.g. EN 60204 or EN 50178).

  Grounding the unit is a necessary protective measure.

  Overcurrent protection devices are a necessary protective measure.
- The unit meets all requirements for reliable isolation of power and electronics connections in accordance with UL508. All connected circuits must also satisfy the requirements for reliable isolation in order to guarantee reliable isolation.
- Take suitable measures to ensure that the connected motor does not start up automatically when the inverter is switched on. To do this, you can connect binary inputs DI01 through DI05 to GND.
- Integral output stage solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes.

2.6.1 Application environment

The following applications are forbidden unless measures are expressly taken to make them possible:

- Use in explosion-proof areas.
- Use in environments with harmful substances:
  - Oils
  - Acids
  - Gases
  - Vapors
  - Dust
  - Radiated interference
  - Other harmful environments
- Use subject to mechanical vibration and shock loads in excess of the requirements in EN 50178.
- If the inverter performs safety functions, which have to guarantee the protection of machinery and people.

2.7 Electrical connection

Observe the applicable national accident prevention guidelines when working on live frequency inverters (e.g. BGV A3 for Germany).

During installation, observe the specifications regarding cable cross sections, fusing and protective conductor connection. This publication contains additional information.

In this documentation, you will find notes on EMC compliant installation, such as shielding, grounding, arrangement of filters and routing of lines. The manufacturer of the system or machine is responsible for maintaining the limits established by EMC legislation.

Protective measures and protection devices must comply with the regulations in force (e.g. EN 60204 or EN 61800-5-1).

Ground the unit.

2.8 Safe disconnection

The unit meets all requirements for safe disconnection of power and electronic connections in accordance with EN 61800-5-1. All connected circuits must also satisfy the requirements for safe disconnection.

2.9 Operation

- Danger of electrical shock resulting in severe or fatal injuries. High voltages are present in the terminals and within the drive for up to 10 minutes after the electrical supply has been disconnected.
  - Disconnect and isolate the MOVITRAC® LTP-B from the electrical supply at least 10 minutes before commencing any work on it.
- Dangerous voltages are present in the output terminals and the cables and motor terminals connected to them when the unit is switched on. Dangerous voltages may also be present when the unit is inhibited and the motor at a standstill.
- The unit is not necessarily deenergized when the LEDs and the 7-segment display are off.
- Safety functions inside the unit or a mechanical blockage may cause the motor to stop. The removal of the source of the malfunction or a reset can result in an automatic restart of the drive. If, for safety reasons, this is not permissible for the driven machine, disconnect the unit from the supply system before correcting the fault.

2.10 Unit temperature

MOVITRAC® LTP-B frequency inverters are usually operated with braking resistors. The braking resistors can also be installed in the housing of the units.

The braking resistors can reach a surface temperature of 70 °C to 250 °C.

Never touch the housing of the MOVITRAC® LTP-B units or the braking resistors during operation or in the cool down phase once the unit has been switched off.

3 General specifications MOVITRAC® LTP-B

3.1 Input voltage ranges

Depending on model and power rating the drives are designed for direct connection to the following supplies:

MOVITRAC® LTP-B size 2 (200 – 240 V):

200 V – 240 V ± 10 %, 1-phase*, 50 – 60 Hz ± 5 %

MOVITRAC® LTP-B all sizes (200 – 240 V):

200 V – 240 V ± 10 %, 3-phase, 50 – 60 Hz ± 5 %

MOVITRAC® LTP-B all sizes (380 – 480 V):

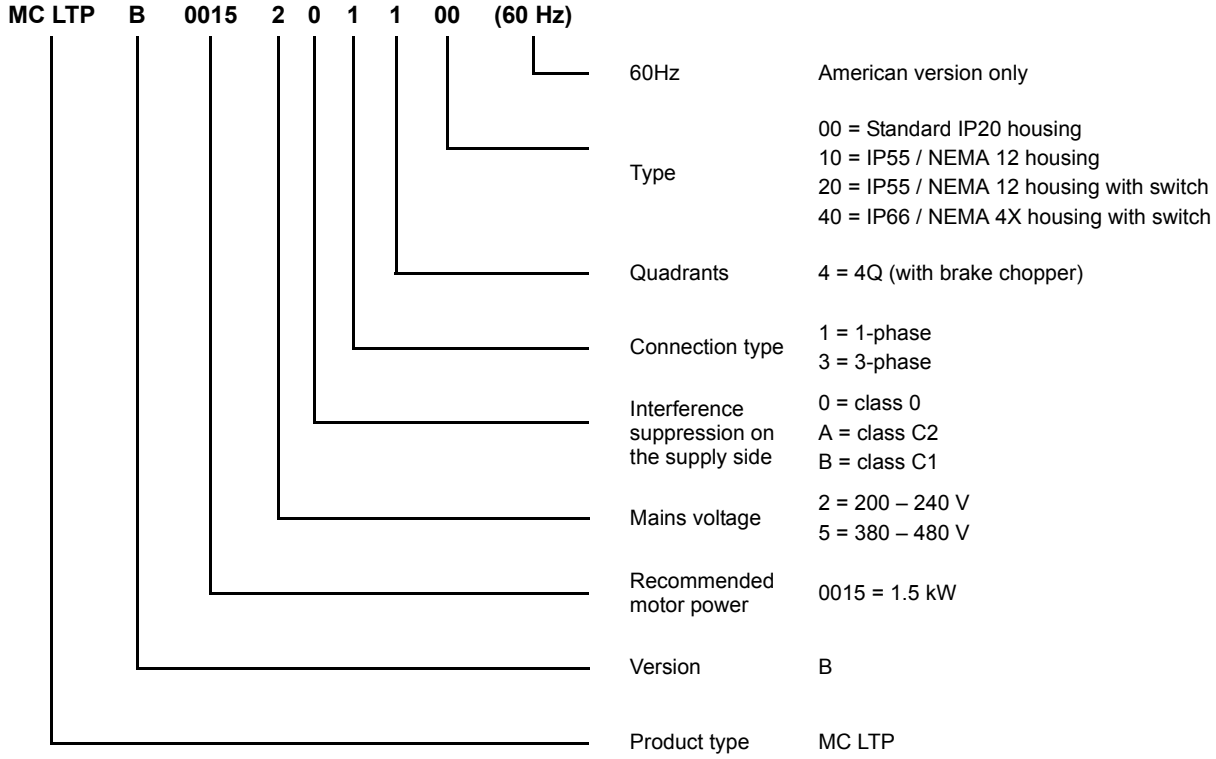
380 V – 480 V ± 10 %, 3-phase, 50 – 60 Hz ± 5 %

- **INFORMATION**

  * It is also possible to connect 1-phase MOVITRAC® LTP-B units to 2-phases of a 200 – 240 V, 3-phase mains.

Products used with a 3-phase supply are designed for a maximum supply imbalance of 3 % between phases. For input supplies which have a supply imbalance greater than 3 % (typically the Indian subcontinent and parts of the Asia Pacific including China) SEW-EURODRIVE recommends the use of input chokes.

3.2 Product designation



3.3 Overload capability

Overload capability	60 seconds	2 seconds
Default setting	150 %	175 %
CMP	200 %	250 %[1)]
Sync 250	200 %	250 %
MGFA2 / MGFA4	300 %	300 %

1) Only 200 % for size 3, 5.5 kW

For motor overload adjustment see parameter *P1-08* in chapter "Parameter Group 1: Basic parameters (Level 1)" (page).

3.4 Protection features

- Output short-circuit, phase-to-phase, phase-to-ground
- Output over-current
- Overload protection
  - Drive delivers 150 % of rated motor current for 60 seconds. See Chapter "Overload capability" (page 14).
- Over-voltage trip
  - Set at 123 % of drive maximum rated supply voltage.
- Under-voltage trip
- Over-temperature trip
- Under-temperature trip
  - Drive will trip if enabled below –10 °C
- Supply phase loss
  - A running drive will trip if 1 phase of a 3-phase supply is lost for more than 15 seconds.

4 Installation

4.1 Mechanical Installation

- Inspect the MOVITRAC® LTP-B carefully prior to installation to ensure it is undamaged.
- Store the MOVITRAC® LTP-B in its box until required. The storage location should be clean and dry and within the ambient temperature range of –40 °C to +60 °C.
- Install the MOVITRAC® LTP-B on a flat, vertical, flame-resistant, vibration-free surface, within a suitable switch cabinet. This should be according to EN 60529 if specific Ingress Protection (IP) ratings are required.
- Do not place flammable material close to the drive.
- Prevent the entry of conductive or flammable foreign bodies.
- The maximum ambient operating temperature is 50 °C for IP20 and 40 °C for IP55 / IP66 drives. The minimum ambient operating temperature is –10 °C.

  Please observe the specific ratings employed in chapter "Environmental" (page 79).
- Relative humidity must be less than 95 % (non-condensing).
- MOVITRAC® LTP-B units can be installed side by side. This gives adequate ventilation space between them. If the MOVITRAC® LTP-B is to be installed above another drive or any other heat-producing device, the minimum vertical spacing is 150 mm. The switch cabinet should either be force-ventilated or large enough to allow natural cooling, see chapter "IP20 housing: mounting and dimensions of switch cabinet" (page 17).
- A DIN rail mounting is supported in size 2 (IP20) drives only.

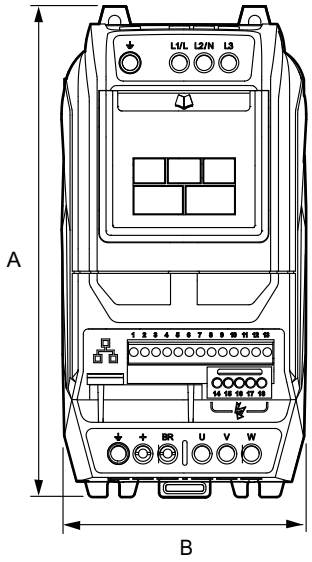
4.2 Dimensions

MOVITRAC® LTP-B is available in 3 housing versions:

- Standard IP20 housing for use in switch cabinets
- IP55 / NEMA 12 K
- IP66 / NEMA 4X

The IP55 / NEMA 12 K and IP66 / NEMA 4X housing is protected against moisture and dust. Therefore, the drives can be operated indoors under harsh conditions. Electronically, the drives are identical and the only differences are the dimensions of the housing and the weight.

4.2.1 Dimensions of the IP20 housing



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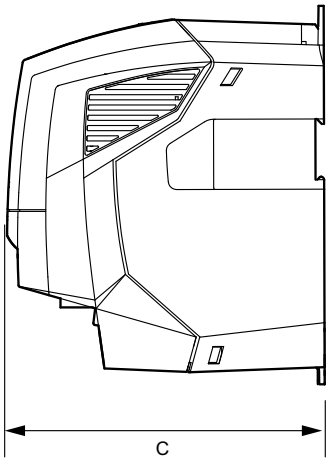

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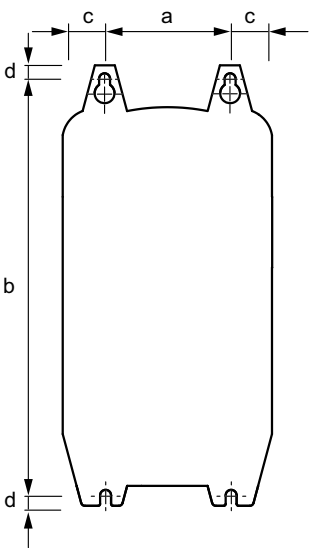

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Dimension		Size 2	Size 3
A (Height)	mm	220	261
	in	8.66	10.28
B (Width)	mm	105	126
	in	4.10	4.96
C (Depth)	mm	185	205
	in	7.28	8.07
Weight	kg	2.0	4.5
	lb	4.40	10.0
a	mm	63.0	80.0
	in	2.48	3.15
b	mm	209.0	247
	in	8.23	9.72
c	mm	23	25.5
	in	0.91	1.02
d	mm	5.25	7.25
	in	0.21	0.29
Power terminal torque settings	Nm	1.0	1.0
	lb.in	8.85	8.85
Recommended screw size		4 × M4	4 × M4

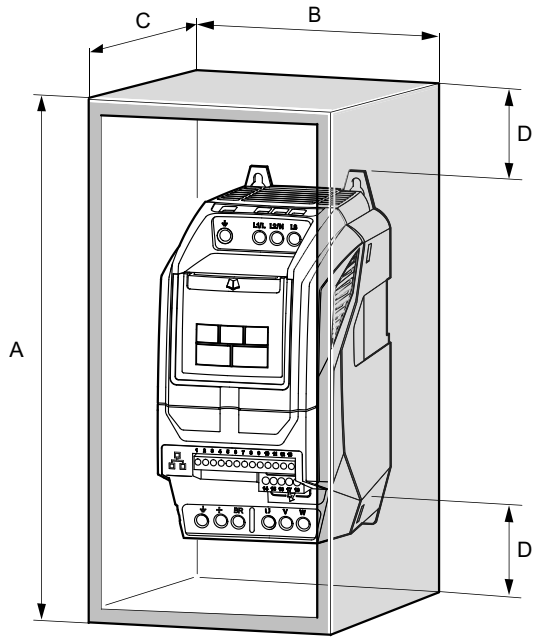
4.3 IP20 housing: mounting and dimensions of switch cabinet

For applications that require a higher IP rating than the IP20 offered by the standard housing, the drive must be mounted in a switch cabinet. The following guidelines should be observed for these applications:

- The switch cabinet should be made from a thermally conductive material, unless forced ventilation is used.
- When a vented switch cabinet is used, there should be venting above and below the drive to ensure good air circulation. Air should be drawn in below the drive and expelled above the drive.
- If the external environment contains contamination particles (e.g. dust), a suitable particle filter should be fitted to the vents and forced ventilation implemented. The filter must be serviced and cleaned as and when necessary.
- Environments with a high moisture, salt or chemical content should use a suitably sealed (non-vented) switch cabinet.

4.3.1 Dimensions of non-vented metal switch cabinet

Drive power rating		Sealed switch cabinet							
		A		B		C		D	
		mm	in	mm	in	mm	in	mm	in
Size 2	0.75 kW, 1.5 kW 230 V 0.75 kW, 1.5 kW, 2.2 kW 400 V	400	15.75	300	11.81	350	11.81	60	2.36
Size 2	2.2 kW 230 V 4.0 kW 400 V	600	23.62	450	17.72	350	11.81	100	3.94



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4.3.2 Dimensions of vented switch cabinet

Drive power rating		Vented switch cabinet							
		A		B		C		D	
		mm	in	mm	in	mm	in	mm	in
Size 2	All ratings	600	23.62	400	15.75	300	11.81	100	3.94
Size 3	All ratings	800	31.5	600	23.62	350	13.78	150	5.91
Size 4	All ratings	1000	39.37	600	23.62	300	11.81	250	9.84
Size 5	All ratings	1000	–	–	–	–	–	–	–
Size 6	All ratings	1000	–	–	–	–	–	–	–
Size 7	All ratings	1000	–	–	–	–	–	–	–

4.3.3 Dimensions of force vented switch cabinet

Drive power rating		Force vented switch cabinet (with fan)								
		A		B		C		D		
		mm	in	mm	in	mm	in	mm	in	Air Flow
Size 2	All ratings	400	15.75	300	11.81	250	9.84	100	3.94	> 45 m^3/h
Size 3	All ratings	600	23.62	400	15.75	250	9.84	150	5.91	> 80 m^3/h
Size 4	All ratings	880	34.65	500	19.69	300	11.81	200	7.87	> 300 m^3/h
Size 5	All ratings	1100	43.31	600	23.62	400	15.75	250	9.84	> 900 m^3/h
Size 6 / 7	All ratings	1900	74.80	600	23.62	500	19.69	300	11.81	> 1000 m^3/h

4.4 Electrical Installation

It is essential to comply with the safety instructions in chapter 2 during installation.

⚠ WARNING

Danger of electrical shock. High voltages are present in the terminals and within the drive for up to 10 minutes after the electrical supply has been disconnected.

Severe or fatal injuries.

- Disconnect and isolate the MOVITRAC® LTP-B from the electrical supply at least 10 minutes before commencing any work on it.

- MOVITRAC® LTP-B units should only be installed by qualified electricians and in accordance with local and national regulations and codes of practice.
- The MOVITRAC® LTP-B has an Ingress Protection rating of IP20. For higher IP ratings, use a suitable enclosure or the IP55 / NEMA 12 or IP66 / NEMA 4X version.
- Where the electrical supply to the drive is through a plug and socket connector, do not disconnect it until 10 minutes have elapsed after turning off the supply.
- Ensure correct earthing connections. See diagram in chapter "Drive and motor connection" (page 24).
- The earth cable must be sufficient to carry the maximum supply fault current, which is normally limited by the fuses or motor circuit breaker.

⚠ WARNING

Risk of fatal injury if the hoist falls.

Severe or fatal injuries.

- MOVITRAC® LTP-B is not designed for use as a safety device in hoist applications. Use monitoring systems or mechanical protection devices to ensure safety.

4.4.1 Prior to installation

- Ensure that the supply voltage, frequency and number of phases (single or 3-phase) correspond to the rating of the MOVITRAC® LTP-B as delivered.
- An isolator or similar should be installed between the power supply and the drive.
- Never connect the mains power supply to the MOVITRAC® LTP-B output terminals U, V or W.
- The cables are only protected when slow blow HRC fuses or a motor circuit breaker (MCB) are used. See chapter "Permitted voltage supply systems" for further information (page 20).
- Do not install any type of automatic switchgear between the drive and the motor. Wherever control cabling is close to power cabling, maintain a minimum separation of 100 mm and arrange crossings at 90 °.
- Ensure that screening or armoring of power cables is effected in accordance with the connection diagram in chapter "Drive and motor connection" (page 24).
- Ensure that all terminals are tightened to the appropriate torque.
- It is recommended that the power cabling should be 4-core, PVC-insulated, screened cable, laid in accordance with local industrial regulations and codes of practice. Conductor end sleeves are required to connect the power cables to the drive.
- The ground terminal of each MOVITRAC® LTP-B should be individually connected directly to the site earth (ground) busbar (through the filter if installed).

  MOVITRAC® LTP-B ground connections should not loop from one drive to another or to / from any other equipment. Ground loop impedance must conform to local industrial safety regulations.

  To meet UL regulations, UL approved ring crimp terminals should be used for all earth wiring connections.

Helpcard

In the IP20 the helpcard is located in a seperate slot above the display.

Permitted voltage supply systems

- **Voltage supply systems with grounded star point**

  MOVITRAC® LTP-B is intended for operation on TN and TT systems with directly grounded star point.
- **Voltage supply systems with non-grounded star point**

  Operation on mains systems with a non-grounded star point (for example IT power systems) is also permitted. SEW-EURODRIVE recommends using an earth-leakage monitor for this according to the PCM (Pulse Code Measuring) principle. Using such devices prevents the earth-leakage monitor from mis-tripping due to the earth capacitance of the drive.
- **External conductor grounded voltage supply systems**

  Only operate the inverters on supply systems with a maximum phase-to-earth voltage of AC 300 V.

Mains contactors

- Only use input contactors of utilization category AC-3 (EN 60947-4-1).
- Ensure a minimum delay of 120 seconds between 2 mains activations.

Input fuses

Fusing types:

- Line protection types in operation classes gL. gG:
  - Rated fusing voltage ≥ rated mains voltage
  - Rated fusing current must be designed for 100 % of the rated inverter current depending on the inverter utilization.
- Line protection switch with characteristics B, C:
  - Circuit breaker rated voltage ≥ rated mains voltage
  - Rated line protection switch currents must be 10 % above the rated inverter current.

Operation on IT systems

SEW-EURODRIVE recommends using earth-leakage monitors with a pulse code measuring process in voltage supply systems with a non-earthed star point (IT systems). Use of such devices prevents the earth-leakage monitor mis-tripping due to the earth capacitance of the drive.

Braking resistor connection

- Shorten the cables to the required length.
- Use 2 tightly twisted leads or a 2-core shielded power cable. Cross-section according to the rated output of the drive.
- Protect the braking resistor with a bimetallic relay with trip class 10 or 10 A (wiring diagram).
- For braking resistors in the BW..-T series, you can connect the integrated thermostat using a 2-core, shielded cable as an alternative to a bimetallic relay.
- The flat-design braking resistors have internal thermal overload protection (fuse cannot be replaced). Install the flat-design braking resistors together with the appropriate touch guard.

Installing the braking resistor

- ⚠ **WARNING** Risk of electrical shock. The supply cables to the braking resistors carry a high voltage (approx. DC 900 V) during rated operation.

  Severe or fatal injuries.

  – Disconnect and isolate the MOVITRAC® LTP-B from the electrical supply at least 10 minutes before removing the supply cable.
- ⚠ **CAUTION** Risk of burns. The surfaces of the braking resistors become very hot when they are loaded with P_{rated}.

  Minor injuries.

  – Choose a suitable installation location.

  – Do not touch the braking resistors.

  – Install an appropriate touch guard.

4.4.2 Installation

Motor terminal box connections

Motors are connected in either Star, Delta, Double Star or Star Nema motors. The motor rating plate will indicate the voltage rating for the method of connection, which must match the operating voltage of the MOVITRAC® LTP-B unit.

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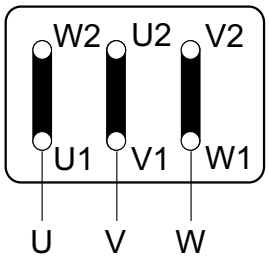
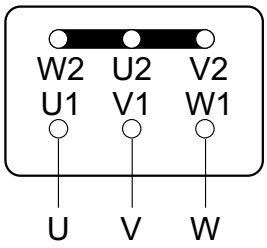


Low voltage Δ



High voltage 人

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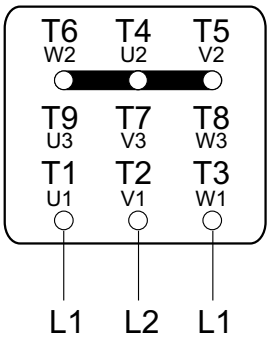
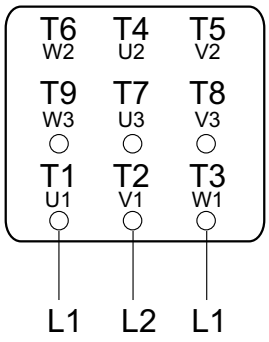
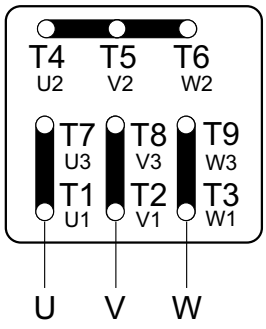


Low voltage 人人

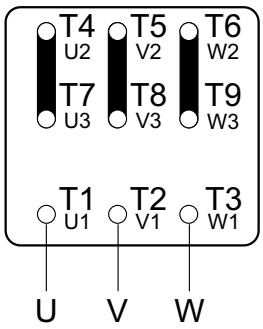


High voltage 人

DT / DV



Low voltage 人人



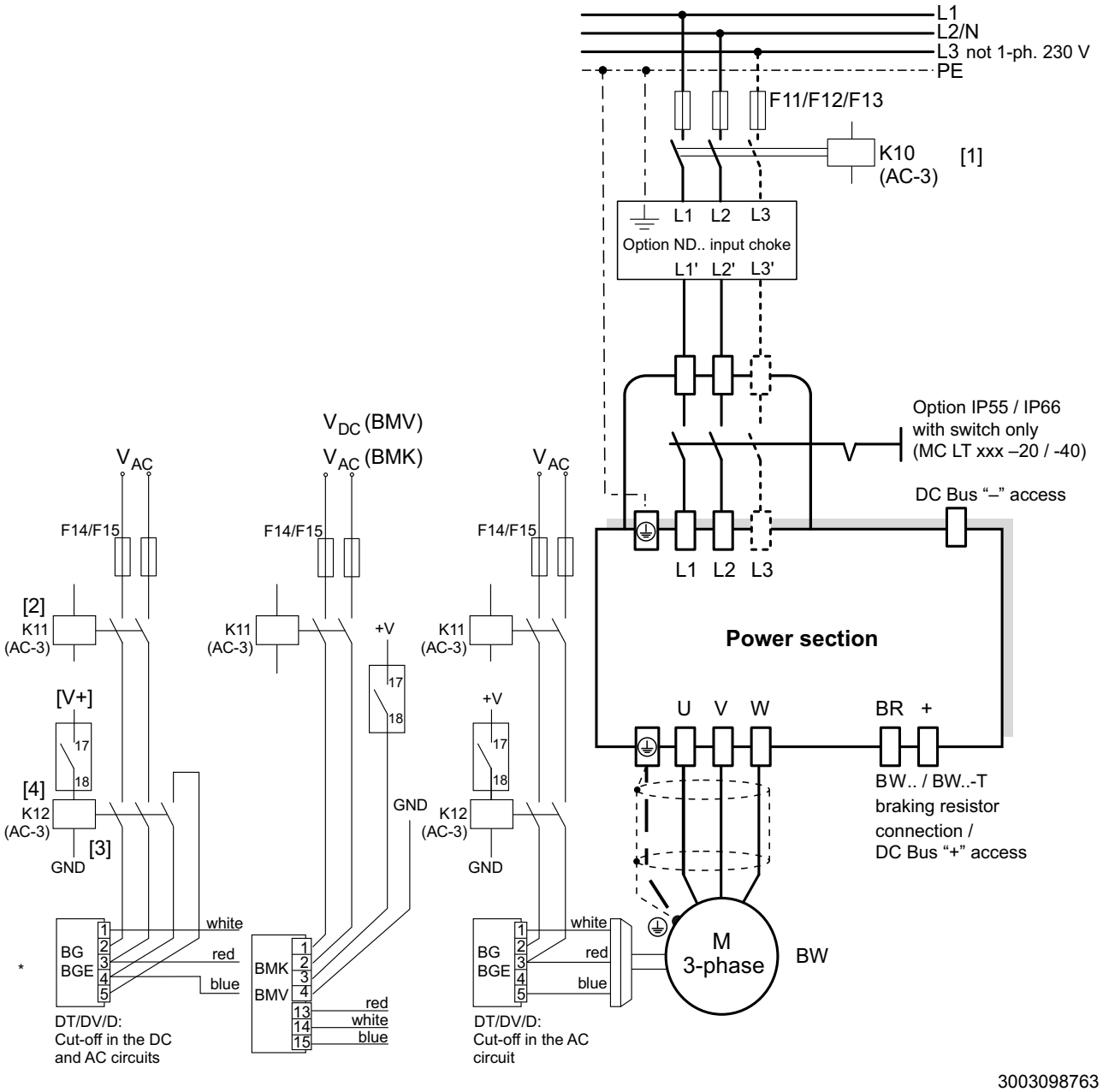
High voltage 人

Drive and motor connection

- ⚠ **WARNING** Risk of electrical shock. Risk of exposure to high voltage may occur if the unit is wired incorrectly.

  Severe or fatal injuries.

  – It is essential to observe the connection sequence illustrated below.



[1] Mains supply contactor to drive

[2] Mains supply to brake rectifier, switched simultaneously by K10

[3] Control contactor / relay, energized via the relay contact [4] inside the drive and supplies the brake rectifier

[4] Potential free relay contact inside the drive

[V+] External power supply for energizing the control contactor / relay

- **INFORMATION**
  - Connect the brake rectifier using a separate supply system lead.
  - **Supply via the motor voltage is not permitted!**

Always switch the brake off on the DC and AC sides for:

- All hoist applications
- Drives that require a rapid brake response time

Motor thermal protection (TF / TH)

Motors with an internal over-temperature sensor (TF, TH or similar) can be connected directly to the MOVITRAC® LTP-B. A trip will then be displayed on the drive.

The sensor is connected to terminal 1 (+24 V) and digital input 3. Parameter *P1-15* must be set to external trip input to receive over-temperature trips. The trip level should be set to 2.5 kΩ. See Chapter "P1-15 Digital inputs function select" (page 71) and Parameter *P2-33* for information on the motor thermistor.

Multi motor / group drive (for induction motors only)

The total of the motor currents must not exceed the rated current of the drive. See chapter "Technical Data" (page 79).

The motor group is limited to 5 drives and the motors in a group must not be more than 3 sizes apart.

The maximum cable length for the group is limited to the values for the individual drives. See chapter "Technical Data" (page 79).

For groups with more than 3 drives SEW-EURODRIVE recommends using an output choke.

Connecting AC brakemotors

For detailed information about the SEW brake system, refer to the "Gearmotors" catalog, which you can order from SEW-EURODRIVE.

SEW brake systems are disk brakes with a DC coil that release electrically and brake using spring force. A brake rectifier supplies the brake with DC voltage.

INFORMATION

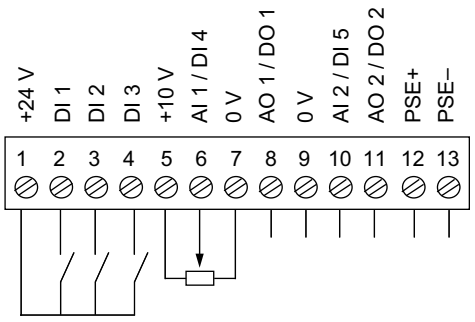
The brake rectifier must have a separate supply system cable for inverter operation; it must not be powered using the motor voltage!

Always activate the brake via binary Relay output 2": do not use the PLC

4.4.3 Signal terminals overview

Main terminals

IP20 and IP55



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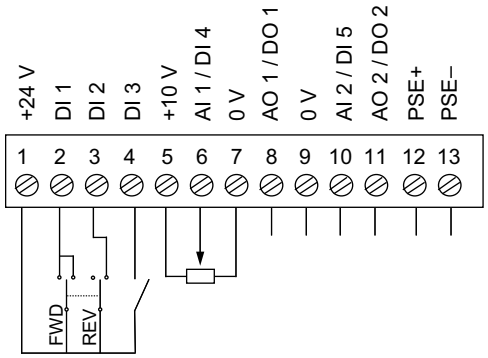
IP55 and IP66 with switch option



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The signal terminal block has the following signal connections:

Terminal no.	Signal	Connection	Description
1	+24 V	+24 V ref out	Ref. to activate DI1 – DI3 (100 mA max.)
2	DI 1	Digital input 1	Positive logic "Logic 1" input voltage range: DC 8 – 30 V "Logic 0" input voltage range: DC 0 – 2 V Compatible with PLC requirement when 0 V is connected to terminal 7 or 9.
3	DI 2	Digital input 2	
4	DI 3	Digital input 3 / thermistor contact	
5	+10 V	+10 V ref out	10 V ref for analog input (pot supply +, 10 mA max., 1 kΩ min.)
6	AI 1 / DI 4	Analog input (12 bit) Digital input 4	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
7	0 V	0 V common	0 V ref (pot supply –)
8	AO 1 / DO 1	Analog output (10 bit) Digital output 1	0 – 10 V, 20 mA analog 24 V, 20 mA digital
9	0 V	0 V common	0 V ref
10	AI 2 / DI 5	Analog input 2 (12 bit) Digital input 5	0 – 10 V, 0 – 20 mA, 4 – 20 mA "Logic 1" input voltage range: DC 8 – 30 V
11	AO 2 / DO 2	Analog output 2 (10 bit) Digital output 2	0 – 10 V, 20 mA analog 24 V, 20 mA digital
12	PSE+	Power stage enable	+24 V must be connected to PSE+
13	PSE–		GND must be connected to PSE–

All digital inputs activated by input voltage in range 8 – 30 V, i.e. +24 V compatible.

- **NOTICE** Possible damage to property.

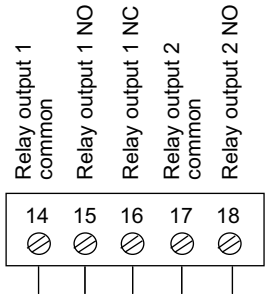
  Voltages greater than 30 V applied to the signal terminals may result in damage to the controller.

  – Only apply voltages up to 30 V to the signal terminals.

- **INFORMATION**

  Terminals 7 and 9 can be used for GND reference if MOVITRAC® LTP-B is controlled via SPS / PLC. Connect ±PSE to +24 V and GND to enable power stage, otherwise the drive display shows "Inhibt".

Relay terminal overview



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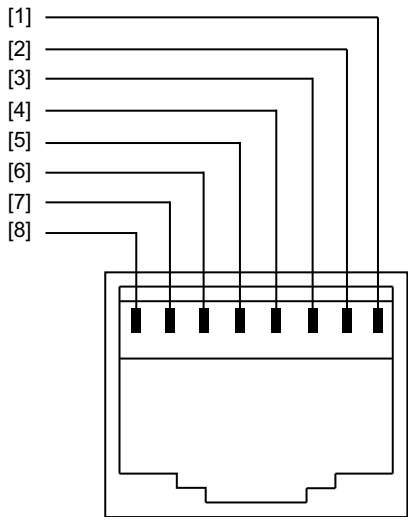
Terminal no.	Signal	Description
14	Relay output 1 common	Relay contact (AC 250 V / DC 30 V @ 5 A)
15	Relay output 1 NO	
16	Relay output 1 NC	
17	Relay output 2 common	
18	Relay output 2 NO	

4.4.4 RJ45 Communication Socket



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[1] RS485+ (Modbus)
[2] RS485– (Modbus)
[3] +24 V
[4] RS485+ (Engineering)
[5] RS485– (Engineering)
[6] 0 V
[7] SBus+ (*P1-12* must be set for SBus communication)
[8] SBus– (*P1-12* must be set for SBus communication)

4.4.5 UL-compliant installation

Note the following for UL-compliant installation:

- The drives can be operated within the following ambient temperatures:

IP-rating	Ambient temperature
IP20	–10 °C to 50 °C
IP55 / NEMA 12	–10 °C to 40 °C
IP66 / NEMA 4X	–10 °C to 40 °C

- Only use copper connection cables which can withstand ambient temperatures of up to 75 °C.
- Permitted tightening torques for MOVITRAC® LTP-B power terminals are:

Size	Tightening torque
2 & 3	1 Nm / 8.9 lb.in
4	4 Nm / 35.4 lb.in
5, 6 & 7	8 Nm / 70 lb.in

MOVITRAC® LTP-B drive inverters are suitable for operation in voltage power systems with an earthed star point (TN and TT systems), which can supply a maximum supply current and a maximum supply voltage in accordance with the following tables. The fuses listed in the following tables are the maximum permitted fuses for each inverter. Only use melting fuses.

Only use tested units with a limited output voltage (V_{max} = DC 30 V) and limited output current (I ≤ 8 A) as an external DC 24 V source.

UL certification does not apply to operation in voltage supply systems with a non-earthed star point (IT systems).

200 – 240 V Units

MOVITRAC® LTP...	Max. supply short circuitcurrent	Max. supply voltage	Max. fuse rating
0004	AC 5000 A	AC 240 V	AC 15 A / 250 V
0008	AC 5000 A	AC 240 V	AC 30A / 250 V
0015	AC 5000 A	AC 240 V	AC 20A / 250 V
0022, 0040	AC 5000 A	AC 240 V	AC 30 A / 250 V
0055, 0075	AC 5000 A	AC 240 V	AC 110 A / 250 V
0110	AC 5000 A	AC 240 V	AC 175 A / 250 V
0150	AC 5000 A	AC 240 V	AC 225 A / 250 V
0220	AC 10000 A	AC 240 V	AC 350 A / 250 V

380 – 480 V Units

MOVITRAC® LTP...	Max. supply short circuitcurrent	Max. supply voltage	Max. fuse rating
0008, 0015	AC 5000 A	AC 480 V	AC 15 A / 600 V
0022, 0040	AC 5000 A	AC 480 V	AC 20 A / 600 V
0055, 0075	AC 5000 A	AC 480 V	AC 60 A / 600 V
0110	AC 5000 A	AC 480 V	AC 110 A / 600 V
0150 / 0220	AC 5000 A	AC 500 V	AC 175 A / 600 V
0300	AC 5000 A	AC 500 V	AC 225 A / 600 V
0370, 0450	AC 10000 A	AC 500 V	AC 350 A / 600 V
0550, 0750	AC 10000 A	AC 500 V	AC 500 A / 600 V

4.4.6 Electromagnetic compatibility

The MOVITRAC® LTP-B range of frequency inverters is designed for use in machines and drive systems. They comply with the EMC product standard EN 61800-3 for variable speed drives. For EMC compliant installation of the drive system, follow the guidelines set out in council directive 2004/108/EC (EMC).

EMC immunity

The MOVITRAC® LTP-B range meets the immunity levels defined in EN 61800-3 for both industrial and domestic (light industrial) environments.

EMC emissions

The MOVITRAC® LTP-B EMC emission levels comply with the limit classifications defined in EN 61800-3 and EN 55014, allowing it to be used in both industrial and domestic (light industrial) applications.

To obtain the best EMC performance the drives should be installed in accordance with the wiring guidelines in chapter "Installation", thereby ensuring good earth connections for the drive system. Screened motor cable must be used to achieve compliance with the radiated emissions levels.

The following table defines the conditions for the use of MOVITRAC® LTP-B in drive applications:

<table>
<tr><th>Drive type / rating</th><th colspan="2">Cat C1 (class B)</th><th>Cat C2 (class A)</th><th>Cat C3</th></tr>
<tr><td>230 V, 1-phase ratings
LTP-B xxxx 2B1-x-xx</td><td colspan="4">No additional filtering required
Use screened motor cable</td></tr>
<tr><td rowspan="2">230 V / 400 V, 3-phase ratings
LTP-B xxxx 2A3-x-xx
LTP-B xxxx 5A3-x-xx</td><td colspan="2">Use external filter type
NF LT 5B3 0xx</td><td colspan="2">No additional filtering required</td></tr>
<tr><td colspan="4">Use screened motor cable</td></tr>
</table>

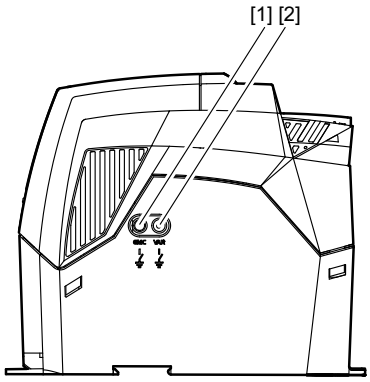
EMC filter varistor disconnection (IP20)

IP20 drives with an EMC filter fitted (e.g. MOVITRAC® LTP-B xxxx xAxx 00 and MOVITRAC® LTP-B xxxx xBxx 00) have an inherently higher leakage current to ground (Earth) than units without EMC filter. If more than 1 MOVITRAC® LTP-B unit is being operated on earth leakage detectors, an earth leakage detector trip may occur, particularly if screened / shielded cables are used. The EMC filter can be disconnected by removing the EMC screw on the side of the unit.

- ⚠ **WARNING** Risk of electrical shock. High voltages are present in the terminals and within the drive for up to 10 minutes after the electrical supply has been disconnected.

  Severe or fatal injuries.

  – Disconnect and isolate the MOVITRAC® LTP-B from the electrical supply at least 10 minutes before removing the EMC screw.



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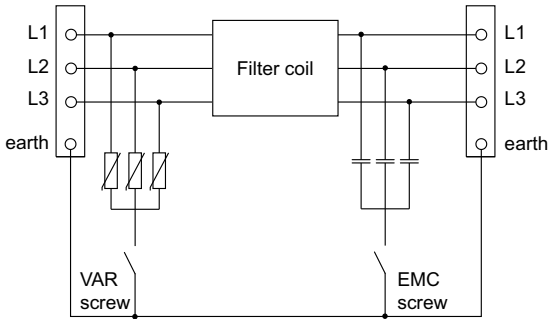
[1] EMC screw

[2] VAR screw



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The MOVITRAC® LTP-B units are fitted with components which suppress surges in the input supply voltage. These components protect the power input circuits against voltage spikes, which may originate from lightning strikes or other equipment on the same supply.

When carrying out a high potential (Flash) test on a drive system, the components which suppress voltage surges may cause the test to fail. To accommodate high voltage system tests remove both screws on the side of the unit, which disconnects these components. Once the high potential test has been completed, replace both screws and repeat the test. The test should then fail, indicating that the circuit is once again protected against voltage surges.

5 Startup

5.1 User interface

5.1.1 Keypad

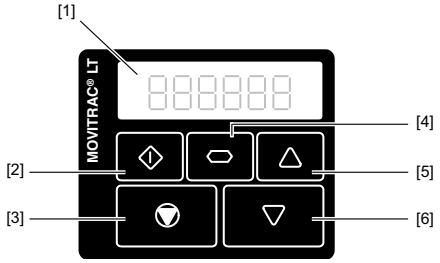
Each MOVITRAC® LTP-B has an integrated keypad as standard, allowing drive operation and setup without any additional equipment.

The keypad consists of 5 keys with the following functions:

Start (Run)	• Enables the running of the motor • Reverses the direction of rotation if bi-directional keypad mode is enabled
Stop/Reset	• Stops the motor • Resets a tripped drive
Navigate	• Displays real time information • Press and hold to enter / exit parameter edit mode • Stores parameter changes
Up	• Increases speed in real time mode • Increases parameter values in parameter edit mode
Down	• Decreases speed in real time mode • Decreases parameter values in parameter edit mode

The <start> / <stop/reset> keys on the keypad are disabled when the parameters have their factory default settings. To enable the operation of the <start> / <stop/reset> keys on the keypad, set *P1-12* to 1 or 2, see chapter "Parameter Group 1: Basic parameters" (page).

The <navigate> key alone is used to gain access to the parameter edit menu. Pressing and holding this key (> 1 sec) allows the user to toggle between the parameter edit menu and the real time display (where the drive operating status / running speed is displayed). By pressing this key (< 1 sec) the user is able to toggle between the operating speed and operating current during drive operation.



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[1]	Display	[4]	Navigate
[2]	Start	[5]	Up
[3]	Stop / Reset	[6]	Down

- **INFORMATION**

  To reset the drive to factory default settings, press the <up>, <down>, and <stop/reset> keys simultaneously for > 2 s. The display then shows "P-deF".

  Press the <stop/reset> key to acknowledge the change and reset the drive.

Advanced keypad operation shortcuts

Function	When display shows ...	Press ...	Result	Example
Fast selection of parameter groups[1)]	Px-xx	<navigate> + <up> keys	The next highest parameter group is selected	• Display shows "P1-10" • Press <navigate> + <up> keys • Display now shows "P2-01"
	Px-xx	<navigate> + <down> keys	The next lowest parameter group is selected	• Display shows "P2-26" • Press <navigate> + <down> keys • Display now shows "P1-01"
Select lowest group parameter	Px-xx	<up> + <down> keys	The first parameter of a group is selected	• Display shows "P1-10" • Press <up> + <down> keys • Display now shows "P1-01"
Set parameter to minimum value	Any numerical value (whilst editing a parameter value)	<up> + <down> keys	The parameter is set to the minimum value	When editing P1-01: • Display shows "50.0" • Press <up> + <down> keys • Display now shows "0.0"
Adjusting individual digits within a parameter value	Any numerical value (whilst editing a parameter value)	<stop/reset> + <navigate> keys	Individual parameter digits can be adjusted	When editing P1-10: • Display shows "0" • Press <stop/reset> + <navigate> keys • Display now shows "_0" • Press <up> key • Display now shows "10" • Press <stop/reset> + <navigate> keys • Display now shows "_10" • Press <up> key • Display now shows "110" etc.

1) Parameter group access must be enabled by setting *P1-14* to "101".

5.1.2 Display

A standard 6-digit, 7-segment display is integrated into each drive to allow drive operation to be monitored and parameters to be set.

5.2 Easy startup for MOVITRAC® LTP-B

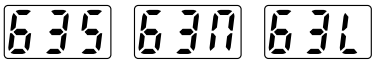
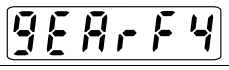
1. Connect the motor to the drive, checking the connection for the motor voltage rating.
2. Enter the motor data from the motor nameplate:
   - *P1-08* = motor rated current
   - *P1-09* = motor rated frequency
3. Adjust the maximum and minimum speed limit using *P1-01* and *P1-02*.
4. Adjust the acceleration and deceleration times using *P1-03* and *P1-04*.
5. Set up the motor nameplate data in parameters *P1-07* to *P1-10*.

5.2.1 Drive setup for permanent magnet motors

MOVITRAC® LTP-B can handle encoderless permanent magnet motors. To run the drive, several settings must be made.

Easy setup for SEW-EURODRIVE preset motors

If one of the following motors is connected to the drive, easy setup can be carried out:

Motor type	Display format
CMP40M	
CMP50S / CMP50M /CMP50L	
CMP63S / CMP63M / CMP63L	
MOVIGEAR® size 2	
MOVIGEAR® size 4	

Procedure

- Set *P1-14* to "1" to access LTX specific parameters
- Set *P1-16* to the preset motor - see chapter "LTX specific parameters (Level 1)" (page).

All necessary parameters (voltage, current etc.) are set automatically.

- **INFORMATION**

  If *P1-16* is set to "GEARF2" or "GEARF4", the overload protection is set to "300 %" in order to supply a high overload torque. The KTY must be connected to ensure motor protection. Make sure the motor is protected with an external protecting device.

Easy setup for SEW-EURODRIVE and 3rd party motors

If a non SEW-EURODRIVE preset motor is connected to MOVITRAC® LTP-B, the following parameters must be set:

- *P1-14* = 101
- *P1-07* = phase-phase permanent magnet motor voltage at rated speed
- *P1-08* = motor rated current
- *P1-09* = motor rated frequency
- *P1-10* = motor rated speed
- *P4-01* = control mode (PM motor speed or torque)
- *P4-02* = 1 runs the auto-tune
- **INFORMATION**

  For detailed information on parameters *P1-07*, *P1-08* and *P1-09* refer to the following Operating Instructions:

  - "Synchronous Servomotors CMP40 – CMP100, CMPZ71 – CMPZ100"

The motor control behaviour (PI-controller) can be adjusted by using *P4-03 Vector speed controller proportional gain* and *P4-04 Vector speed controller integral time constant*.

- ⚠**WARNING** Risk of motor powering up. Auto-tune needs no enable to be carried out. Once *P4-02* is set to "1", the auto-tune runs automatically and the motor is powered up. The motor may be turning!

  Severe or fatal injuries.

  – Do not remove the cable during operation.

  – Do not touch the motor shaft.

  By setting *P1-16* to "In-Syn" the overload capacity is set to "150 %", depending on *P1-08*.

5.2.2 Terminal mode (default setting) *P1-12* = 0

To operate in terminal mode (default setting):

- Ensure that *P1-12* is set to "0" (default setting).
- Connect a switch between terminals 1 and 2 on the user terminal block.
- Connect a potentiometer (1 – 10 k) between terminals 5, 6 and 7 with the wiper connected to pin 6.
- Enable the drive by making a connection between terminals 1 and 2.
- Adjust the speed with the potentiometer.

- **INFORMATION**

  The default settings (*P1-12* = 0 and *P1-15* = 1) for the optional switch in the IP55 / IP66 switch cabinet is FWD / REV. The motor speed can be set via the potentiometer.

5.2.3 Keypad mode (*P1-12* = 1 or 2)

To operate in keypad mode:

- Change *P1-12* to "1" (uni-directional) or "2" (bi-directional).
- Place a wire link or switch between terminals 1 and 2 on the user terminal block to enable the drive.
- Now press the <start> key. The drive enables at 0.0 Hz.
- Press the <up> key to increase the speed.
- To stop the drive, press the <stop/reset> key.
- If the <start> key is now pressed, the drive will return to its original speed. (If bi-directional mode is enabled (*P1-12* = 2), pressing the <start> key reverses the direction.)

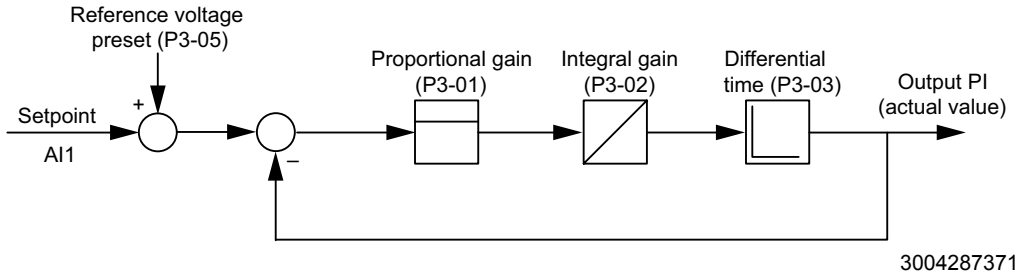
- **INFORMATION**

  The desired target speed can be preset by pressing the <stop/reset> key whilst the drive is stopped. When the <start> key is subsequently pressed, the drive will then ramp to this speed.

5.2.4 PID controller mode (P1-12 = 3)

The implemented PID controller can be used for temperature control, pressure control or other applications.

The following illustration shows the installation of the PID controller.



Connect the actual value from the sensor (temperature, pressure etc.) to analog input 1 (AI1). The actual value can be scaled up or down or assigned an offset value, thereby adapting it to the working range of the PID controller. See chapter "User PID control (Level 2)" (page).

The PID controller setpoint reference can be set using *P3-05*.

In default settings the setting for the speed ramp times has no effect when the PID controller is active. Depending on the PID error value (the difference between the setpoint and the reference), the ramps can be activated via *P3-11*.

5.2.5 Master-Slave mode (*P1-12* = 4)

The MOVITRAC® LTP-B has a built-in Master-Slave function. This is a dedicated protocol for the drive, allowing the Master-Slave communication to take place. Up to 63 drives can be connected together on a communications network using the RJ45 connector. One drive must be configured as the master with the remaining drives configured as slaves. Only one master drive is permitted per network, and the master drive then outputs its operating state (e.g. Stopped, Running) and output frequency every 30 ms. The slave drives will then follow the running / stopped status of the master drive, and the master drive's output frequency becomes the setpoint frequency for all the slave drives.

Configuring the master drive

The master drive on any network must have communication address 1 on that network.

- Set *P5-01 Drive address (communications)* to "12".
- Set *P1-12* to any value other than 4.

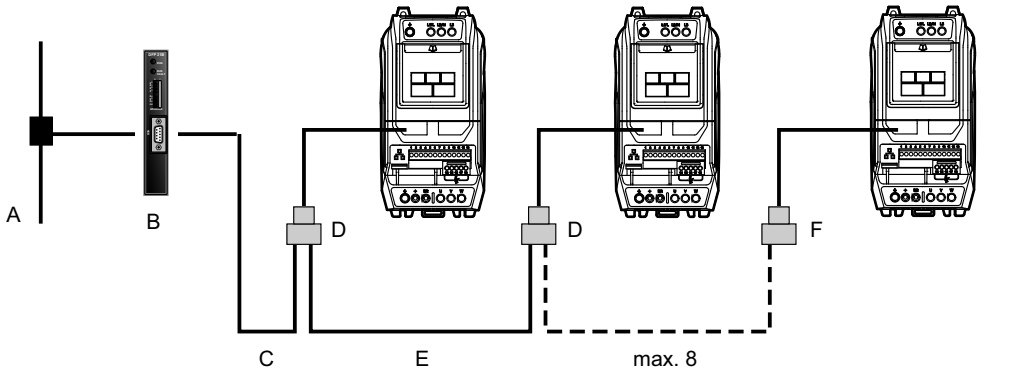
Configuring the slave drive(s)

- Each connected slave drive must have a unique slave communications address set in *P5-01*. The range of slave addresses available is 2 to 63.
- Set *P1-12* to "4".
- Set *P2-28* to the mode of speed scaling control.
- Set *P2-29* to the value of speed scaling factor.

5.2.6 Startup for operation via Fieldbus (MOVILINK®) (*P1-12* = 5)

- Start the drive as instructed at the start of chapter "Easy startup".
- Set parameter *P1-12* to "5" to control the drive via SBus.
- Set *P1-14* to "101" (default) to give access to the extended menu.
- Set the values in parameter group 5 as follows:
  - For a unique SBus address set *P5-01* to between 1 and 63.
  - For an SBus baud fitted to the gateway, set *P5-02* to "500 kBaud" (default).
  - Define the timeout behavior of the drive when communication is interrupted in *P5-05*:
    - 0: Trip and coast to stop
    - 1: Ramp to stop and trip
    - 2: Ramp to stop (without trip)
    - 3: Hold speed (continue with last data)
- Set the timeout time for the communications channel in *P5-06*.
- Set *P5-07* to "1" to control ramp times via process data (PO3). Setting to "0" indicates that ramp times are followed by setting in *P1-03* or *P1-04*.
- Connect the drive via SBus to the DFx / UOH-Gateway according to chapter "RJ45 communication socket" (page 27).
- Set the dipswitch AS on the DFx / UOH-Gateway from OFF to ON to perform the auto-setup for the fieldbus gateway. The LED "H1" on the gateway will flash repeatedly and then remain off. If the LED "H1" is lit then the gateway or one of the drives on the SBus isn't connected or wasn't started correctly.
- The configuration of the fieldbus communication between DFx / UOH-Gateway and bus master is described in the corresponding DFx manual.

Wiring for Gateway and MOVI-PLC®



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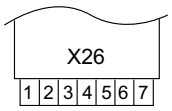
[A] Bus connection
[B] Gateway (e.g. DFx / UOH-Gateway)
[C] Cable to wire
[D] Splitter
[E] Selection cable
[F] Terminating resistor

Connecting Gateway / PLC in UOH housing

Side view Stand-alone unit	Designation	Terminal		Connection to RJ45 connector (page 27)
 2108496651	X26 connector: CAN 1 and voltage supply (plug-in terminal)	X26:1	CAN 1H	SBus+
		X26:2	CAN 1L	SBus-
		X26:3	DGND	0 V
		X26:4	Reserved	–
		X26:5	Reserved	–
		X26:6	DGND	–
		X26:7	DC 24 V	–

Monitoring of the data transferred

The monitoring of the data transferred via the gateway can be achieved via one of the following options:

- MOVITOOLS® MotionStudio via the gateway's X24 engineering interface or optional via Ethernet.
- The gateway's web page (e.g. on DFE3x Ethernet gateways).

Description of the transferred process data (PD)

Process-data words (16-bit) from the gateway to the drive (PO):

Description		Bit		Settings
PO1	Control word	0	Controller inhibit	0: Run 1: Stop
		1	Fast stop on 2nd deceleration ramp (*P-24*)	0: Fast stop 1: Run
		2	Stop on process ramp *P1-03* / *P1-04* or PO3	0: Stop 1: Run
		3 – 5	Reserved	0
		6	Trip reset	Edge 0 to 1 = trip reset
		7 – 15	Reserved	0
PO2	Setpoint speed	Scaling: 0x4000 = 100 % of maximum speed as set in *P1-01* Values greater than 0x4000 or less than 0xC000 are limited to 0x4000 / 0xC000		
PO3	Ramp-Time (if *P5-07* = 1)	Scaling: acceleration and deceleration in ms for rated speed n = 50 Hz		
	No function (if *P5-07* = 0)	Ramp times as set in *P1-03* and *P1-04*		

Process-data words (16-bit) from the drive to the gateway (PI):

Description		Bit		Settings	Byte
PI1	Status word	0	Enable output stage	0: Disabled 1: Enabled	Low byte
		1	Inverter ready	0: Not ready 1: Ready	
		2	PO data enabled	1 if *P1-12* = 5	
		3 – 4	Reserved		
		5	Fault / Warning	0: No fault 1: Fault	
		6	Limit switch clockwise active	0: Disabled 1: Enabled	
		7	Limit switch counterclockwise active	0: Disabled 1: Enabled	
		8 – 15	Drive status if Bit 5 = 0 0x01 = Safe stop active 0x02 = No enable 0x05 = Speed control 0x06 = Torque control 0x0A = Technologie function 0x0C = Reference travel		High byte
		8 – 15	Drive status if Bit 5 = 1 See chapter "Fault codes" (page 44) .		
PI2	Actual speed	Scaling: 0x4000 = 100 % of maximum speed as set in *P1-01*			
PI3	Actual current	Scaling: 0x4000 = 100 % of maximum current as set in *P1-08*			

Example:

The following information will be sent to the drive if:

- the binary inputs are configured and wired correctly to enable the drive.
- parameter *P1-12* is set to "5" to operate the drive via SBus.

Description		Value	Description
PO1	Control word	0	Stop on 2nd deceleration ramp (*P2-25*)
		1	Coast to stop
		2	Ramp to stop on process ramp *P1-04*
		3 – 5	Reserved
		6	Ramp up (*P1-03*) and run with setpoint speed (PO2)
PO2	Setpoint speed	0x4000	= 16384 = maximum speed e.g. 50 Hz (*P1-01*) clockwise
		0x2000	= 8192 = 50 % of maximum speed e.g. 25 Hz clockwise
		0xC000	= –16384 = maximum speed e.g. 50 Hz *(P1-01)* counterclockwise
		0x0000	= 0 = minimum speed as set in *P1-02*

The process data read back from the drive should be in run condition:

Description		Value	Description
PI1	Status word	0x0407	Status = run Output stage enabled Drive ready PO-Data enabled
PI2	Actual speed	Should be equal to PO2 (setpoint speed)	
PI3	Actual current	Depends on speed and load	

5.2.7 Fieldbus / Modbus (*P1-12* = 7)

To operate in Modbus RTU mode, *P1-12* must be set to "7". The drive address is the same as the SBus address. The Modbus modes and baudrate can be set via parameter group 5. See chapter "Modbus control" (page 76) for the Modbus register description.

- **INFORMATION**

  Modbus is not available if the LTX encoder module is fitted.

5.2.8 MOVI-PLC® Motion Protocol (*P1-12* = 8)

If MOVITRAC® LTP-B runs with or without an LTX encoder module in CCU mode for a MOVI-PLC®, the drive must be set to the following parameters:

- Set *P1-14* to "1" to enable the LTX specific parameter group (parameters *P1-01* – *P1-20* are now visible).
- If a Hiperface® encoder is connected to the encoder card, *P1-16* should display the correct motor type. Otherwise the specific motor type must be selected via the <up> or <down> keys.
- Assign a unique drive address in *P1-19*.
- The SBus baudrate (*P1-20*) must be set to "1000 kbaud".

6 Operation

To enable the operational status of the drive to be determined at any time, the following information is displayed:

Status	Mnemonic display
Drive OK	Static drive status
Drive running	Operational drive status
Fault / trip	Fault

6.1 Drive status

6.1.1 Static drive status

The following list indicates which mnemonics will be displayed as drive status information when the motor is at a standstill.

Mnemonic	Description
StoP	Drive power stage disabled. This message will be displayed when the drive is stopped and no faults are present. The drive is ready for normal operation.
P-deF	Default parameters loaded. This message will be displayed when the user invokes the command to load the factory default parameters. The <stop/reset> key has to be pressed before the drive can be operated again.
Stndby	Drive is in standby mode. If *P2-27* is greater than 0 s, this message will be displayed after the drive is on zero speed and the setpoint is also "0".
Inhibit	Drive will show inhibit if the STO contacts are not supplied with 24 V and GND. Output stage is disabled.

6.1.2 Operational drive status

The following list indicates which mnemonics will be displayed as drive status information when the motor is in operation.

Use the <navigate> key on the keypad to toggle between output frequency, output current and speed.

Mnemonic	Description
H xxx	The drive output frequency is displayed in Hz. This message will be displayed when the drive is running.
A xxx	The drive output current is displayed in Amps. This message will be displayed when the drive is running.
P xxx	The current drive output power is displayed in kW. This message will be displayed when the drive is running.
Auto-t	Automatic motor parameter measurement is carried out to configure the motor parameters. Auto-tune runs automatically on first enable if the drive is set to "Vector mode" (*P4-01*) after the parameter default operation. No hardware enable is required to run auto-tune.
Ho-run	Reference travel started. Wait until drive is in reference position. Display will show "Stop" after success.
xxxx	The drive output speed is displayed in rpm. This message will be displayed when the drive is running and the motor rated speed is entered in parameter *P1-10*.
C xxx	Speed scaling factor (*P2-21 / P2-22*).
. . . . . (flashing dots)	The output current of the drive exceeds the current set in *P1-08*. MOVITRAC® LTP-B will monitor the level and duration of the overload. Depending on the overload level, the MOVITRAC® LTP-B will trip with "I.t-trP".

6.1.3 Trip reset

If a trip occurs it can be reset by pressing the <stop/reset> key or by opening and closing digital input 1. See chapter "Fault Codes" (page 44) for further information.

7 Service and fault codes

7.1 Troubleshooting

Symptom	Cause and Solution
Overload or over-current trip on unloaded motor during acceleration	Check the Star / Delta terminal connection in the motor. The rated operating voltage of the drive and motor should match. The Delta connection always gives the lower voltage rating of a dual voltage motor.
Overload or over-current – motor does not spin	Check whether the rotor is locked. Check that the mechanical brake is released (if fitted).
Drive will not enable – display remains on "StoP"	• Check that the hardware enable signal is applied to digital input 1. • Ensure that the user +10 V output voltage (between terminals 5 and 7) is correct. • If not, check the wiring to the user terminal strip. • Check *P1-12* for terminal / keypad mode. • If keypad mode is selected, press the <start> key. • Check that the supply voltage is within specification.
Drive will not power up in very cold ambient temperatures	If the ambient temperature is less than –10 °C, the drive may not power up. Ensure that a local heating source keeps the ambient temperature above –10 °C in these conditions.
Extended menus cannot be accessed	Ensure that *P1-14* is set to the extended access code. This is "101" unless the code in *P2-40* has been changed by the user.

7.2 Fault history

The parameter *P1-13* in the parameter mode holds a record of the 4 most recent trips and / or events. Each trip will be displayed in abbreviated text, with the most recent trip being displayed first (on entering *P1-13*).

Whenever a new trip occurs, this is entered at the top of the list and the other trips move down. The oldest trip will then be removed from the trip log.

- **INFORMATION**

  If the most recent trip in the trip log is an "under-voltage" trip, further under-voltage trips will not be entered into the trip log. This is to ensure that the trip log does not fill up with under-voltage trips which occur naturally every time the MOVITRAC® LTP-B is turned off.

7.3 Fault codes

Code	Trip message	Explanation	Solution
01	"h-O-I" "O-I"	Over-current on drive output to motor. Excess load on motor. Over temperature on drive heat-sink.	Trip during constant speed: • Investigate overload or malfunction. Trip on drive enable: • Check for stalled or jammed motor. • Check for star-delta motor wiring error. • Check cable length is within drive specification. Trip during operation: • Check for sudden overload or malfunction. • Possible cable fault between drive and motor. • Acceleration / deceleration time may be too short, requiring too much power. If *P1-03* or *P1-04* cannot be increased, a larger drive is required.
04	"OI-b"	Brake channel over current. Over current in the brake resistor circuit.	• Check cabling to the braking resistor. • Check braking resistor value. • Ensure minimum resistance values from the rating tables are observed.
	"OL-br"	Braking resistor overload	• Increase deceleration time, reduce load inertia or add further braking resistors in parallel. • Ensure minimum resistance values from the rating tables are observed.
06	"P-LOSS"	Input phase loss trip	Drive intended for use with 3-phase supply has lost 1 input phase.
07	"O.Uolt"	Over-voltage on DC bus	• Check supply voltage is within limits. • If trip occurs on deceleration, increase deceleration time in *P1-04*. • If necessary, connect a braking resistor.
	"Flt-dc"	DC-bus ripple too high	Check power supply
08	"I.t-trP"	Drive overload trip, occurring when the drive has been delivering > 100 % rated current (set in *P1-08*) for a period of time. The display flashes to indicate an overload condition.	• Increase acceleration ramp (*P1-03*) or decrease motor load. • Check cable length is within drive specification. • Check the load mechanically to ensure it is free and no jams, blockages or other mechanical faults exist.
11	"O-t" "O-HFAT"	Heatsink over temperature	• Check drive cooling and enclosure dimensions. • Additional space or cooling may be required. • Reduce switching frequancy
14	"Enc 01"	Encoder feedback faults (Only visible when an encoder module is connected and enabled)	Encoder communication loss
	"Enc 02"		Encoder feedback speed error
	"Enc 03"		• Incorrect encoder PPR count set in parameters • Check P1-10 for correct nameplate speed
	"Enc 04"		Hiperface® signal loss / line encoder channel A error
	"Enc 05"		Line encoder channel B error
	"Enc 06"		Line encoder channel A and B error
	"Enc 07"		• Hiperface® data channel error • Motor is spinning during power up
	"Enc 08"		Hiperface® IO communication channel fault
	"Enc 09"		Hiperface® type not supported
	"Enc 10"		KTY not connected

Code	Trip message	Explanation	Solution
25	"dAtA-E"	Internal memory fault	• Parameters not saved, defaults reloaded. • Try again. If problem reoccurs, contact SEW-EURODRIVE Service.
	"data-F"	EEPROM fault. Parameters not saved, defaults reloaded.	EEPROM fault. Parameters not saved, defaults reloaded. If fault reoccurs contact SEW-EURODRIVE Service.
26	"E-triP"	External trip (connected to digital input 5)	• E-trip on digital input 5. Normally closed contact has opened for some reason. • Check motor thermistor (if connected).
31	"F-PTC"	Motor thermistor trip	• Trip on digital input 5. Normally closed contact has opened. • Check motor thermistor • Check motor temperature
39	"Ho-trp"	Reference travel failed	• Check reference cam • Check limit switch connection • Check reference travel type setting and required parameters.
42	"Lag-Er"	Lag errror trip	• Check encoder connection • Extend ramps • Set P component to higher value • Reset speed controller parameters • Increase lag error tolerance • Check wiring of encoder, motor and line phase. • Check whether mechanical system components can move freely or if they are blocked
47	"Sc-Fxx"	Communication loss trip	• Check communication link between drive and external devices. • Make sure each drive in the network has its unique address.
81	"At-F01"	Auto-tune failed	Measured motor stator resistance varies between phases. • Ensure motor is connected correctly and free from faults. • Check windings for correct resistance and balance.
	"At-F02"		• Measured motor stator resistance is too high. • Ensure motor is connected correctly and free from faults. • Check that power rating corresponds to power rating of connected drive.
	"At-F03"		• Measured motor inductance is too low. • Ensure motor is connected correctly and free from faults.
	"At-F04"		• Measured motor inductance is too high. • Ensure motor is connected correctly and free from faults. • Check that power rating corresponds to power rating of connected drive.
	"At-F05"		• Measured motor parameters are not convergent. • Ensure motor is connected correctly and free from faults. • Check that power rating corresponds to power rating of connected drive.
113	"4-20 F"	Analog input current out of range	• Check input current is within range defined in *P2-30 and P2-33*. • Check cable connection.
117	"U-t"	Under temperature	• Occurs when ambient temperature is less than –10 °C • Raise temperature to over –10 °C in order to start the drive.
198	"U.Uolt"	Under-voltage on DC bus	Occurs routinely when drive powered down. If it occurs whilst running, check supply voltage.

Code	Trip message	Explanation	Solution
200	"PS-trP"	Internal power stage fault	Trip on drive enable: • Check for wiring error or short circuit. • Look for ph-ph or ph-Earth short circuit. Trip during operation: • Check for sudden overload or over-temperature. • Additional space or cooling may be required.
	"FAN-F"	Cooling fan fault	Contact SEW-EURODRIVE Service
	"th-Flt"	Faulty thermistor on heatsink	Contact SEW-EURODRIVE Service.
–	"P-dEF"	Factory default parameters have been loaded.	Press <stop> key. Drive is ready to configure for particular application.
–	"SC-FLt"	Internal drive fault	Contact SEW-EURODRIVE Service.
	"FAULtY"		
	"Prog_ _"		
–	"Out.F"	Internal drive fault	Contact SEW-EURODRIVE Service.
–	"U-torq"	Under torque limit timeout	• Torque threshold not exceeded in time • Increase time in *P4-16* or • Increase torque limit in *P4-15*
–	"O-torq"	Over torque limit timeout	• Check motor load • Increase value in *P4-07*
–	"Etl-24"	External 24 V operation	Power supply is not connected • Check supply voltage and connection

7.4 SEW electronics service

7.4.1 Send in for repair

Please contact **SEW-EURODRIVE electronics service if a fault cannot be rectified**.

Please provide the following information when sending the unit in for repair:

- Serial number (→ nameplate)
- Unit designation
- Brief description of the application (application, control via terminals or serial)
- Connected components (motor, etc.)
- Nature of the error
- Accompanying circumstances
- Your own presumption of what has happened
- Any unusual events preceding the problem, etc.

8 Parameters

8.1 Overview of parameters

8.1.1 Real-time monitoring parameters (read-only)

Parameter group 0 provides access to internal drive parameters for monitoring purposes. These parameters cannot be adjusted.

Parameter group 0 is visible if *P1-14* is set to "101".

Parameter	Description	Display range	Explanation
P0-01	Analog input 1 value	0 – 100 %	100 % = maximum input voltage
P0-02	Analog input 2 value	0 – 100 %	100 % = maximum input voltage
P0-03	Digital input status	Binary value	Digital drive input status
P0-04	Speed controller reference	–100.0 – 100.0 %	100 % = base frequency (*P1-09*)
P0-05	Torque controller reference	0 – 100.0 %	100 % = motor rated torque
P0-06	Digital speed reference	*–P1-01 – P1-01* in Hz	Speed displayed in Hz / rpm
P0-07	Speed reference via communications link	*–P1-01 – P1-01* in Hz	–
P0-08	User PID reference	0 – 100 %	PID controller reference value
P0-09	User PID feedback	0 – 100 %	PID controller feedback value
P0-10	User PID output	0 – 100 %	Reference – Feedback
P0-11	Applied motor voltage	V rms	Value of RMS voltage applied to motor
P0-12	Output torque	0 – 200.0 %	Torque output in %
P0-13	Trip log	Recent 4 trips log with time tag	Shows 4 most recent trips. UP / DOWN keys toggle between sub-items.
P0-14	Magnetising current (Id)	A rms	Magnetising current in A rms
P0-15	Rotor current (Iq)	A rms	Rotor current in A rms
P0-16	Magnetic field strength	0 – 100 %	Magnetic field strength
P0-17	Stator resistance (Rs)	Ω	Phase – Phase stator resistance
P0-18	Stator inductance (Ls)	H	Stator inductance in Henry
P0-19	Rotor resistance (Rr)	Ω	Calculated rotor resistance
P0-20	DC bus voltage	V DC	Internal DC bus voltage
P0-21	Drive temperature	°C	Internal drive temperature
P0-22	DC bus voltage ripple	V rms	Internal DC bus voltage ripple
P0-23	Time accumulated above 80 °C (heatsink)	Hours and minutes	Length of time of drive operated > 80°C
P0-24	Time accumulated above 60 °C (ambient)	Hours and minutes	Length of time of drive operated > 60°C
P0-25	Rotor speed (estimated)	Hz	Applies to vector modes only
P0-26	kWh meter	0.0 – 999.9 kWh	Cumulative energy consumption
P0-27	MWh meter	0.0 – 65535 MWh	Cumulative energy consumption
P0-28	Software version and checksum	e.g. "1 1.00", "1 4F3C" "2 1.00", "2 Ed8A"	Version number and check sum
P0-29	Drive type	e.g. "HP 2", "2 400" "3-PhASE"	Version number and check sum
P0-30	Drive Serial number	000000 – 000000 (SN grp 1) 000-00 – 999-99 (SN grp 2, 3)	Fixed serial number
P0-31	Hours run since date of manufacture	Hours and minutes	Shows global runtime (not affected by resetting factory default parameters)
P0-32	Run time since last trip (1)	99999 hours	Run-time clock stopped by drive disable (or trip), reset on next enable only if a trip occurred. Reset also on next enable after a power down.

Parameter	Description	Display range	Explanation
P0-33	Run time since last trip (2)	99999 hours	Run-time clock stopped by drive disable (or trip), reset on next enable only if a trip occurred (under-voltage not considered a trip). Not reset by power down / power up cycling unless a trip occurred prior to power down. Also on next enable after a power down.
P0-34	Run time since last disable	99999 hours	Run-time clock reset after drive disable
P0-35	Drive cooling fan run time	Display in hours (resettable + non-resettable)	Run-time clock for internal fan
P0-36	DC bus voltage log (256 ms)	Most recent 8 samples prior to trip	8 most recent values prior to trip
P0-37	DC bus voltage ripple log (20 ms)	Most recent 8 samples prior to trip	8 most recent values prior to trip
P0-38	Heatsink temperature log (30 s)	Most recent 8 samples prior to trip	8 most recent values prior to trip
P0-39	Ambient temperature log (30 s)	Most recent 8 samples prior to trip	8 most recent values prior to trip
P0-40	Motor current log (256 ms)	Most recent 8 samples prior to trip	8 most recent values prior to trip
P0-41	Critical fault counter –O–I	–	Counter for critical specific fault
P0-42	Critical fault counter –O-Volts	–	Counter for critical specific fault
P0-43	Critical fault counter –U–Volts	–	Counter for critical specific fault
P0-44	Critical fault counter –O–Temp (Heatsink)	–	Counter for critical specific fault
P0-45	Critical fault counter –b O–I	–	Counter for critical specific fault
P0-46	Critical fault counter –O-Temp (Ambient)	–	Counter for critical specific fault
P0-47	Internal I/O comms error count	0 – 65535	–
P0-48	Internal DSP comms error count	0 – 65535	–
P0-49	Modbus comms error count	0 – 65535	–
P0-50	CANbus comms error count	0 – 65535	–

8.1.2 Parameter registers

The following table lists all parameters together with their factory settings (underlined): Numerical values are displayed with the complete setting range.

Modbus Register	SEW Index	Related Parameter	Range / Default
101	11020	*P1-01 Maximum speed*	*P1-02* – 50.0 Hz – 5 × *P1-09*
102	11021	*P1-02 Minimum speed*	0 – P1-01 Hz
103 /104	11022 / 11023	*P1-03 / P1-04 Acceleration ramp time / Deceleration ramp time*	0 – 5.0 – 600 s
105	11024	*P1-05 Stop mode*	0 / Ramp to stop / 1 / Coast to stop
106	11025	*P1-06 Energy saving function*	0 / Off / 1 / On
107	11012	*P1-07 Motor rated voltage*	
108	11015	*P1-08 Motor rated current*	20 % of rated current…rated current
109	11009	*P1-09 Motor rated frequency*	25 – 50/60 – 500 Hz
110	11026	*P1-10 Motor rated speed*	0 – 30000 rpm
111	11027	*P1-11 Voltage boost*	0 – 20 % (default value is drive depending)
112	11028	*P1-12 Control signal source*	0 (Terminal mode)
113	11029	*P1-13 Trip log*	
114	11030	*P1-14 Extended parameter access*	0 – 30000
115	11031	*P1-15 Digital inputs function select*	0 – 1 – 25
116	11006	*P1-16 Motor type*	In-Syn
117	11032	*P1-17 Servo module function select*	1 – 6
118	11033	*P1-18 Motor thermistor select*	0 / Disabled
119	11105	*P1-19 Drive address*	1 – 63
120	11106	*P1-20 SBus baudrate*	125, 250, 500, 1000 kbaud
121	11017	*P1-21 Stiffness*	
122	11149	*P1-22 Motor load inertia*	0 – 10 – 600
201	11036	*P2-01 Preset speed 1*	-P1-01 – 5.0 Hz – P1-01
202	11037	*P2-02 Preset speed 2*	-P1-01 – 10.0 Hz – P1-01
203	11038	*P2-03 Preset speed 3*	-P1-01 – 25.0 Hz – P1-01
204	11039	*P2-04 Preset speed 4*	-P1-01 – 50.0 Hz – P1-01
205	11040	*P2-05 Preset speed 5*	-P1-01 – 0.0 Hz – P1-01
206	11041	*P2-06 Preset speed 6*	-P1-01 – 0.0 Hz – P1-01
207	11042	*P2-07 Preset speed 7*	-P1-01 – 0.0 – P1-01
208	11043	*P2-08 Preset speed 8*	-P1-01 – 0.0 – P1-01
209	11044	*P2-09 Skip frequency centre point*	P1-02 – P1-01
210	11045	*P2-10 Skip frequency band*	0.0 Hz – P1-01
211	11046	*P2-11 – P2-14 Analog outputs*	0 – 8 – 12
212	11047	*P2-12 Analog output format*	0 – 10 V
213	11048	*P2-13 Analog output 2 function select*	0 – 9 – 12
214	11049	*P2-14 Analog output 2 format*	0 – 10 V
215	11050	*P2-15 User relay 1 output function select*	0 – 1 – 7
216	11051	*P2-16 User relay 1 /analog output 1 upper limit*	0.0 – 100.0 – 200.0 %
217	11052	*P2-17 User relay 1 / analog output lower limit*	0.0 – 200.0 %
218	11053	*P2-18 User relay 2 output function select*	0 – 1 – 8
219	11054	*P2-19 User relay 1 /analog output 1 upper limit*	0.0 – 100.0 – 200.0 %
220	11055	*P2-20 User relay 1 / analog output lower limit*	0.0 – 200.0 %
221	11056	*P2-21 Display scaling factor*	-30.000 – 0.000 – 30000
222	11057	*P2-22 Display scaling source*	
223	11058	*P2-23 Zero speed holding time*	0.0 – 0.2 – 60.0 s
224	11003	*P2-24 Switching frequency*	2 – 16 kHz (drive depending)
225	11059	*P2-25 2nd deceleration ramp*	0.00 – 30.0 s
226	11060	*P2-26 Flying start enable*	0 / Disabled
227	11061	*P2-27 Standby mode*	0.0 – 250 s
228	11062	*P2-28 Slave speed scaling control*	0 / Disabled
229	11063	*P2-29 Slave speed scaling factor*	-500 – 100 – 500 %

Modbus Register	SEW Index	Related Parameter	Range / Default
230	11064	*P2-30 Analog input 1 format*	0 – 10 V, 10 – 0 V / / Unipolar voltage input
231	11065	*P2-31 Analog input 1 scaling*	0 – 100 – 500 %
232	11066	*P2-32 Analog input 1 offset*	-500 – 0 – 500 %
233	11067	*P2-33 Analog input 2 format*	
234	11068	*P2-34 Analog input 2 scaling*	0 – 100 – 500 %
235	11069	*P2-35 Analog input 2 offset*	-500 – 0 – 500 %
236	11070	*P2-36 Start mode select*	
237	11071	*P2-37 Keypad restart speed*	
238	11072	*P2-38 Mains loss stop control*	
239	11073	*P2-39 Parameter lock*	0 / Disabled
240	11074	*P2-40 Extended parameter access code definition*	0 – 101 – 9999
301	11075	*P3-01 PID proportional gain*	0.1 – 30.0
302	11076	*P3-02 PID integral time constant*	0.0 – 1.0 – 30.0
303	11077	*P3-03 PID differential time constant*	0.00 – 1.00
304	11078	*P3-04 PID operating mode*	0 / Direct operation
305	11079	*P3-05 PID reference select*	
306	11080	*P3-06 PID digital reference*	0.0 – 100.0 %
307	11081	*P3-07 PID controller high limit*	P3-08 – 100.0 %
308	11082	*P3-08 PID controller low limit*	0.0 % – P3-07 %
309	11083	*P3-09 PID output control*	
310	11084	*P3-10 PID feedback select*	0 / Analog input 2
311	11085	*P3-11 PID error to enable ramps*	0.0 – 25.0 %
312	11086	*P3-12 PID feedback value display scaling factor*	0.000 – 50.000
313	11087	*P3-13 PID feedback wake-up level*	0.0 – 100.0 %
401	11089	*P4-01 Control mode*	2/ Speed control - Enhanced V/F
402	11090	*P4-02 Auto tune*	0 / Disable
403	11091	*P4-03 Speed controller Proportional gain*	0.1 – 50 – 400 %
404	11092	*P4-04 Speed controller Integral time constant*	0.001 – 0.100 – 1.000 s
405	11093	*P4-05 Motor power factor*	0.50 – 0.99 (drive depending)
406	11094	*P4-06 Torque control reference*	0 / Maximum torque limit
407	11095	*P04-07 Maximum motoring torque limit*	P4-08 – 200 – 500 %
408	11096	*P4-08 Minimum torque limit*	0.0 – P4-07 %
409	11097	*P4-09 Maximum regenerating torque limit*	P4-08 – 200 – 500 %
410	11098	*P4-10 V/F characteristic adjustment frequency*	0.0 – 100.0 % of P1-09
411	11099	*P4-11 V/F characteristic adjustment voltage*	0.0 – 100.0 % of P1-07
412	11100	*P4-12 Motor brake control*	0 / Disabled / 1 / Enabled
413	11101	*P4-13 Motor brake release time*	0.0 – 0.2 – 5.0 s
414	11102	*P4-14 Motor brake apply time*	0.0 – 5.0 s
415	11103	*P4-15 Torque threshold for brake release*	0.0 – 1.0 – 200 %
416	11104	*P4-16 Torque threshold timeout*	0.0 – 5.0 s
501	11105	*P5-01 Drives address*	1 – 63
502	11106	*P5-02 SBus baudrate*	
503	11107	*P5-03 Modbus baudrate*	
504	11108	*P5-04 Modbus data format*	n-1 / No parity, 1 stop bit
505	11109	*P5-05 Communication loss action*	2 / Ramp to stop (no trip)
506	11110	*P5-06 Communication loss timeout*	0.0 – 1.0 – 5.0 s
507	11111	*P5-07 Ramps set via SBus*	0 / Disabled
508	11112	*P5-08 Sync. Cyclic period*	0, 5 – 10 ms

8.2 Explanation of the parameters

8.2.1 Paramertergroup 1: Basic parameters (Level 1)

P1-01 Maximum speed

Setting range: *P1-02* – 50.0 Hz – 5 × *P1-09* (but max 500 Hz)

Sets the upper limiting boundary defining the maximum frequency (speed) that can be applied to the motor in any mode of operation. This parameter will be displayed in Hz in the factory default state or whenever the motor rated speed parameter (*P1-10*) is zero. If the motor rated speed in rpm has been entered into *P1-10*, this parameter will be displayed in rpm.

The maximum speed is also limited by the switching frequency, which is set by *P2-24*. The limit is given by : Maximum output frequency to motor = *P2-24 / 16*.

P1-02 Minimum speed

Setting range: 0 – P1-01 Hz

Sets the lower limiting boundary defining the minimum frequency (speed) that can be applied to the motor in any mode of operation. This parameter will be displayed in Hz in the factory default state or whenever the motor rated speed parameter (P1-10) is zero. If the motor rated speed in rpm has been entered into P1-10, this parameter will be displayed in rpm.

The speed will only drop below this level after the drive enable signal has been removed, when the drive will ramp the output frequency to zero.

P1-03 / P1-04 Acceleration ramp time / Deceleration ramp time

Setting range: 0 – 5.0 – 600 s

Defines the time taken in seconds for the output frequency (speed) to increase/decrease from zero to 50 Hz / 50 Hz to zero. Note that the ramp rate is unaffected by changing either the maximum or minimum speed limits since the ramp time is related to 50 Hz and not to *P1-01* / *P1-02.*

P1-05 Stop mode

Setting range: 0 / Ramp to stop / 1 / Coast to stop

- 0 / Ramp stop: The drive speed is ramped down to zero according to the setting of P1-04 whenever the drive enable signal is removed. The power stage will only be disabled when the drive output frequency reaches zero. (If a zero speed holding time is set in P2-23, this the drive will hold zero speed for this time before disabling).
- 1/ Coast to stop: In this case, the drive output will be disabled as soon as the enable signal is removed, leaving the motor to coast down to zero in an uncontrolled fashion (coast to stop)

P1-06 Energy saving function

Setting range: 0 / Off / 1 / On

When enabled the drive automatically reduces the applied motor voltage on light load

P1-07 Motor rated voltage

Setting range:

- 230 V drives: 0,20 – 230 – 250 V
- 400 V drives: 0,20 – 400 – 500 V

Defines the rated voltage of the motor connected to the drive (as stamped on the motor name plate). The parameter value will be used in V/F speed control mode to control the output voltage applied to the motor. In V/F speed control mode, the drive output voltage will be controlled so as to give the value set in *P1-07* when the output speed is equal to the motor base frequency defined in *P1-09*.

P1-08 Motor rated current

Setting range: 20 % of rated current…rated current in absolute value

Defines the rated current of the motor connected to the drive (as stamped on the motor name plate). This allows the drive to match its internal motor thermal protection (I x t protection) to the motor itself. This ensures that the drive will trip on motor overload (I.t-trP) before any thermal damage results in the motor.

P1-09 Motor rated frequency

Setting range: 25 – <u>50/60</u>[1] – 500 Hz

Defines the rated frequency of the motor connected to the drive (as stamped on the motor name plate). This is the frequency at which maximum (rated) output voltage will be applied to the motor. Above this frequency, the applied motor voltage is held constant at its maximum value.

P1-10 Motor rated speed

Setting range: <u>0</u> – 30000 rpm

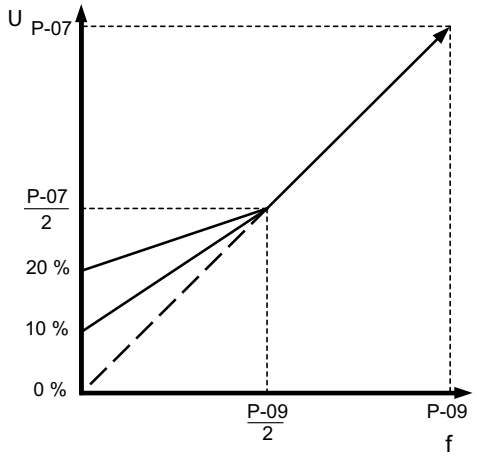
Defines the rated speed of the motor (in rpm) to be connected to the drive (as stamped on the motor name plate) which should be entered into this parameter if it is required that the drive displays its speed in rpm. When a non-zero value has been entered, the operating speed will be displayed in rpm. The speed related parameters (i.e. *P1-01*, *P1-02*, *P2-02* etc) will also be displayed in rpm.

In vector mode, the displayed value in rpm represents the shaft speed of the motor. In V/F speed control mode, entering a non-zero value into this parameter will activate the automatic slip compensation. If the synchronous speed has been entered into *P1-10*, slip compensation will be disabled, but the speed display will still be in rpm.

P1-11 Voltage boost

Setting range: 0 – 20 % (default value is depending on inverter voltage and kW rating)

Sets the applied boost voltage at low speeds to assist with starting sticky loads. It modifies the V/F characteristics in limits setting by ½ P-07 and ½ P1-09.



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1) 60 Hz (American Version only)

P1-12 Control signal source

This parameter allows the user to define whether the drive should be controlled from the user terminal connector, from the push buttons on the front of the keypad or to enable the internal PID controller. See chapter "Easy startup for frequency inverter mode" (page 33) .

- 0 (Terminal mode)
- 1 or 2 (Keypad mode)
- 3 (PID controller mode)
- 4 (Slave mode)
- 5 (SBus Movilink)
- 6 (CANopen)
- 7 (Fieldbus/Modbus)
- 8 (Multimotion)

P1-13 Trip log

Holds a record of the most recent four trips and / or events that have occurred. Each trip will be displayed in abbreviated text, with the most recent trip being displayed first .Whenever a new trip occurs, this is entered at the top of the list and the other trips are shifted down. The oldest trip will then be removed from the trip log. Note that if the most recent trip in the trip log is an "Under-voltage' trip, further Undervoltage trips will not be entered into the trip log. This ensures that the trip log does not fill up with Under-voltage trips, which naturally occur every time the drive is turned off.

P1-14 Extended parameter access

Setting range: 0 – 30000

This parameter allows the user to gain access to parameter groups other than the basic parameter set (parameter P1-01..P1-15). Access is permitted when the following value entered is valid.

- 0 / P1-01..P1-15
- 1 / P1-01..P1-22
- 101 /P1-01..P5-08

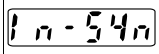
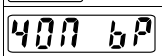
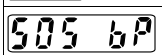
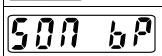
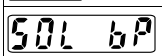
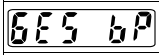
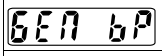
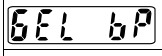
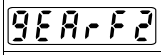
P1-15 Digital inputs function select

Setting range: 0 – 1 – 25

Defines the function of the digital inputs. See chapter "P1-15 Digital inputs function select" (page 71) .

8.2.2 Servo specific parameters (Level 1)

P1-16 Motor type Selects the type of motor

Display value	Motor type	Explanation
	Induction motor	Default setting. Leave it as it is if none of the other selections are appropriate. The selection of Induction motor or permanent magnet motor is done via P4-01.
	Undefined Servo motor	Undefined servo motor. Specific servo parameter have to be set during the drive startup. (see chapter 5.2.1). In this case P4-01 has to be set to PM motor control operation.
	CMP40M	Preset SEW-Eurodrive CMP motors. By selecting one of these motor types all motor specific parameters are set automatically. The overload behavior is set to 200% for 60s and 250% for 2s.
	CMP40M with brake	
	CMP50S	
	CMP50S with brake	
	CMP50M	
	CMP50M with brake	
	CMP50L	
	CMP50L with brake	
	CMP63S	
	CMP63S with brake	
	CMP63M	
	CMP63M with brake	
	CMP63L	
	CMP63L with brake	
	Movigear size 2	Selection for Movigear operation. Select the matching size. All necessary parameters are set automatically. The overload in this case is 300% of nominal current.
	Movigear size 4	

Use this parameter to select preset motors (CMP and MOVIGEAR®). This parameter is set automatically if Hiperface encoder information is read via LTx encoder card.

When permanent magnet motor is connected and the drive is operating in frequency inverter mode, *P1-16* doesn't need to be changed. In this case *P4-01* selects the motor type (Autotune necessary).

P1-17 Servo module function select

Setting range: 1 – 6

Selects functionality of servo module I/O. See chapter *P1-17* servo module function select".

P1-18 Motor thermistor select

0 / Disabled

1 / KTY

Note if a motor is selected via *P1-16* this parameter will change to 1. Available in Conjuction with LTx-Servomodule only.

P1-19 Drive address

Setting range: 1 – 63

Mirror parameter of *P5-01*. A change of *P1-19* will have an immediate effect of *P5-01*

P1-20 SBus baudrate

Setting range: 125, 250, 500, 1000 kbaud

This parameter is a mirror parameter of *P5-02*. A change of *P1-20* will have an immediate effect of *P5-02*.

P1-21 Stiffness

P1-22 Motor load inertia

Setting range: 0 – 10 – 600

Allows the inertia ratio between the motor and connected load to be entered into the drive. This value can normally be left at the default value 10; however it is used by the drive control algorithm as a feed forward term for CMP/PM motors in order to provide optimum torque/current to accelerate the load. Hence accurate setting of the inertia ratio will produce better system response and dynamics. The calculation for closed loop operation is

$$P1-P2 = \frac{JLoadcomplete}{M0_{motor}} \bullet \frac{10^5}{s^2}$$

If value is unknown then leave value set to default 10.

8.2.3 Parametergroup 2: Extended parameter setting (Level 2)

P2-01 Preset speed 1

Setting range: -P1-01 – 5.0 Hz – P1-01

P2-02 Preset speed 2

Setting range: -P1-01 – 10.0 Hz – P1-01

P2-03 Preset speed 3

Setting range: -P1-01 – 25.0 Hz – P1-01

P2-04 Preset speed 4

Setting range: -P1-01 – 50.0 Hz – P1-01

P2-05 Preset speed 5

Setting range: -P1-01 – 0.0 Hz – P1-01

Also used for homing mode speed

P2-06 Preset speed 6

Setting range: -P1-01 – 0.0 Hz – P1-01

Also used for homing mode speed

P2-07 Preset speed 7

Setting range: -P1-01 – 0.0 – P1-01

Used for brake release speed in hoist mode

P2-08 Preset speed 8

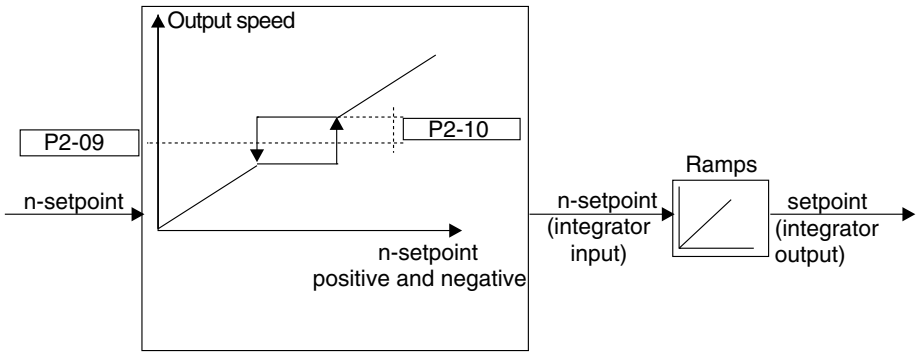
Setting range: -P1-01 – 0.0 – P1-01

Used for brake apply speed in hoist mode

P2-09 Skip frequency centre point

Setting range: P1-02 – P1-01

The skip window center and skip width are values and automatically have an effect on positive and negative setpoints when activated. The function is deactivated by setting the skip width to 0.



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P2-10 Skip frequency band

Setting range: 0.0 Hz – P1-01

P2-11 – P2-14 Analog outputs

Digital output mode: (0V/24V)

Set.	Function	Explanation
0	Drive enabled	Logic 1 when drive enabled (running)
1	Drive healthy (digital)	Logic 1 when no fault exists on drive
2	Motor at target speed (digital)	Logic 1 when motor speed matches setpoint speed
3	Motor speed ≥ 0 (digital)	Logic 1 when motor runs above 0 speed
4	Motor speed ≥ limit (digital)	Digital output enabled using level set in limit “User relay/analog output upper limit” and “user relay/analog output lower limit”.
5	Motor torque ≥ limit (digital)	
6	Analog input 2 ≥ limit (digital)	
7	Motor current ≥ limit (digital)	

Analog output mode: (0..10V or 0/4..20mA)

Set.	Function	Explanation
8	Motor speed (analog)	The amplitude of the analog output signal represents the motor speed. It is scaled from zero to the maximum speed limit, as defined in P1-01.
9	Motor current (analog)	The amplitude of the output analog signal represents the motor load current (torque). It is scaled from zero to 200 % of motor rated current, as defined in P1-08.
10	Motor torque (analog)	
11	Motor power (analog)	The amplitude of the output analog signal represents the output power of the drive. It is scaled from zero to drive rating power.
12	SBus (analog)	Analog output value is controlled via SBus if P1-12=8

P2-11 Analog output 1 function select

Setting range: 0 – 8 – 12

P2-12 Analog output format

0 – 10 V
10 – 0 V
-10 – 10 V
0 – 20 mA, 20 – 0 mA
4 – 20 mA, 20 – 4 mA

P2-13 Analog output 2 function select

Setting range: 0 – 9 – 12
Parameter description as P2-11

P2-14 Analog output 2 format

0 – 10 V
10 – 0 V
-10 – 10 V
0 – 20 mA, 20 – 0 mA
4 – 20 mA, 20 – 4 mA

P2-15 – P2-20 Relay outputs

Functions:

Set.	Function	Explanation
0	Drive enabled	Relay contacts closed when drive is enabled.
1	Drive healthy (digital)	Relay contacts closed when drive is healthy (no trip).
2	Motor at target speed (digital)	Relay contacts closed when output frequency within " 0.1 Hz of the target frequency.
3	Motor speed ≥ 0 (digital)	Relay contacts closed when the output frequency is greater than "Zero frequency'(0.3 % of base frequency)
4	Motor speed ≥ limit (digital)	Relay contacts closed when output frequency is greater than the limit that is set in Parameter "User relay upper limit". And relay contacts open when less than the limit in "User relay lower limit"
5	Motor current ≥ limit (digital)	Relay contacts closed when motor current/torque is greater than the current limit value that is set in Parameter "User relay upper limit". And relay contacts open when less than the limit in "User relay lower limit"
6	Motor torque ≥ limit (digital)	
7	Analog input 2 ≥ limit (digital)	Relay contacts closed when second analog input value is greater than the limit that is set in Parameter "User relay upper limit". And relay contacts open when less than the limit in "User relay lower limit"
8	Hoist (only for P2-18)	This parameter will be displayed if P4-12 hoist function is set to 1. The drive now controls the relay contact for hoist mode operation. (Value can't be changed if P4-12=1)

P2-15 User relay 1 output function select

Setting range: 0 – 1 – 7
See table P2-15 – P2-20

P2-16 User relay 1 /analog output 1 upper limit

Setting range: 0.0 – 100.0 – 200.0 %

P2-17 User relay 1 / analog output lower limit

Setting range: 0.0 – 200.0 %

P2-18 User relay 2 output function select

Setting range: 0 – 1 – 8

See table P2-15 – P2-20

P2-19 User relay 1 /analog output 1 upper limit

Setting range: 0.0 – 100.0 – 200.0 %

P2-20 User relay 1 / analog output lower limit

Setting range: 0.0 – 200.0 %

P2-21 /22 Display scaling

P2-21 enables the user to scale the data from a selected source to provide a displayed value that better represents the controlled process. The source value to be used by the display scaling calculation is defined in P2-22.

If P2-21 has a non-zero value, then a scaled display value becomes visible on the display in addition to motor speed, motor current and motor power. Pressing the <NAVIGATE> button cycles through the real-time values. A lower case character "c" on the left-hand side of the display indicates that the scaled display value is being displayed. The scaled display value is calculated by the following equation:

Scaling display value = P2-21 × Scaling source value

P2-21 Display scaling factor

Setting range: -30.000 – 0.000 – 30000

P2-22 Display scaling source

- 0 Motor speed information is used as scaling source data.
- 1 Motor current information is used as scaling source data.
- 2 Second analog input value is used as scaling source data. In this case, the range of input data value is from 0 to 4096.

P2-23 Zero speed holding time

Setting range: 0.0 – 0.2 – 60.0 s

This parameter could enable the drive stay at zero speed (0 Hz) for a certain time whenever drive receives a stop command and reduces the output speed to zero before the output signal be completely shut down.

If P2-23=0, the output of the drive will be shut down immediately when output speed reach zero.

If P2-23 not equal to zero, the drive will keep at zero speed for a certain period, which is specified by P2-23 in seconds, before the output of the drive shutting down. This function usually operates in conjunction with relay output function so that the drive would give out a relay control signal before the drive output is disabled.

P2-24 Switching frequency

Setting range 2 – 16 kHz (drive depending)

Sets the output switching frequency. Higher switching frequencies means less noise development on the motor but higher losses in the output stage. Maximum output switching frequency depends on drive power rating.

The drive reduces the switching frequency on drive temperature automatically.

P2-25 2nd deceleration ramp

Setting range: 0.00 – 30.0 s

Deceleration 2nd ramp down time. Selected automatically on mains power loss if P2-38 = 2.

Can also be selected by digital inputs, dependent on other parameter settings. When set to "0", drive decelerates as quickly as possible, whilst preventing an over-voltage trip.

P2-26 Flying start enable

When enabled, drive starts from detected rotor speed. Short delay possible if rotor stationary (only available if P4-01 = 0, 1 or 2).

0 / Disabled

1 / Enabled

P2-27 Standby mode

Setting range: 0.0 – 250 s

If P2-27 > 0, drive enters standby mode (disables output) if minimum speed maintained for time specified in P2-27. If P2-23 > 0 or P4-12=1, this function is disabled.

P2-28/29 Master/ Slave parameters

The drive will use parameterP2-28/29 to scale the speed reference value that has been received from the master in the network system.

This function is especially suitable for those applications in which all drives in the network should be synchronized but run at different speeds based on a fixed scaling factor.

For example, if a slave drive set P2-29 to 80 % and P2-28=1 and the master drive of the network runs at 50 Hz, then the slave drive will run at 40 Hz after being enabled.

P2-28 Slave speed scaling control

0 / Disabled

1 / Actual speed = Digital speed x P2-29

2 / Actual speed =(Digital speed x P2-29) + Analog input 1 reference

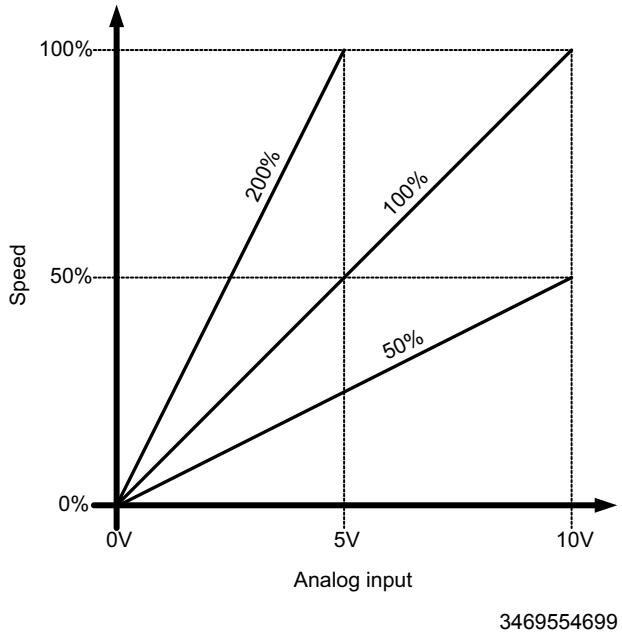
3 / Actual speed = Digital speed x P2-29 x Analog input 1 reference

P2-29 Slave speed scaling factor

Setting range: -500 – 100 – 500 %

P2-30 – P2-35 Analog inputs

These parameters allow the user to configure the analog input 1 and 2 to suit the format of the signal connected to the analog input control terminals. When set to 0...10V, all negative input voltages will- give zero speed. When set to -10 – 10 V, all negative voltages will result in the drive running with a negative speed, where the speed is proportional to the magnitude of the input voltage.



P2-30 Analog input 1 format

<u>0 – 10 V</u>, 10 – 0 V / / Unipolar voltage input

10 – 10V / Bipolar voltage input

0 – 20 mA / Current input

t4 – 20 mA, t20-4 mA

"t" indicates the drive will trip if the signal is removed whilst the drive is enabled.r4 – 20 mA, 20 – 4 mA

"r" indicates the drive will ramp to P1-02 if the signal is removed whilst the drive is enabled.

P2-31 Analog input 1 scaling

Setting range: 0 – <u>100</u> – 500 %

P2-32 Analog input 1 offset

Setting range: -500 – <u>0</u> – 500 %

Sets an offset, as a % of full scale range of input, applied to analog input signal.

P2-33 Analog input 2 format

0 – 10 V, 10 – 0 V / / Unipolar voltage input

PTC-th / Motor thermistor input

0 – 20 mA / Current input

t4 – 20 mA, t20 – 4 mA

"t" indicates the drive will trip if the signal is removed whilst the drive is enabled.

r4 – 20 mA, 20 – 4 mA

"r" indicates the drive will ramp to P1-02 if the signal is removed whilst the drive is enabled.PTC-th has to be selected whilst P1-15 is selected to a reaction for external trip to ensure motor thermal protection.

P2-34 Analog input 2 scaling

Setting range: 0 – 100 – 500 %

P2-35 Analog input 2 offset

Setting range: -500 – 0 – 500 %

Sets an offset, as a % of full scale range of input, applied to analog input signal.

P2-36 Start mode select

Following a trip drive will make up to 5 attempts to restart at 20 second intervals. Drive must be powered down to reset counter.

The number of restart attempts are counted. If drive fails to start on final attempt, drive will fault and require user to reset fault manually.

Edge-r / Edge requires the run signal to be applied after a trip or a power up before the drive will run. If the enable signal is present on power up, the drive will not run.

Auto-0 / Auto-run enables whenever a run signal is present (assuming no trip). If the run signal is present on power up, the drive will run immediately.

Auto-1..Auto-4 / As Auto-0, except for the fact that the drive will attempt to auto restart after a trip. The number of re-start attempts is given by the number after the "Auto-". The restart counter is reset after a power down or a reset operation that performed by user through pushbuttons.

P2-37 Keypad restart speed

Active only when P1-12 = 1

0 / Following a stop and restart drive will run at minimum speed

1 / Following a stop and restart drive will run at last setpoint speed

2 / Drive remains at current speed while switching to digital pot mode

3 /Following a stop and restart drive will run at Preset Speed 8 (P2-08)

P2-38 Mains loss stop control

Controls behavior of drive in response to loss of mains power supply whilst drive enabled.

0 / Drive will attempt to continue operating by recovering energy from load motor. Providing mains loss period is short, and sufficient energy can be recovered before drive control electronics power off, drive will automatically restart when mains power returns.

1 / Drive will immediately disable output to motor, allowing load to coast or free wheel. When using this setting with high inertia loads, spin start function (P2-26) may need to be enabled.2 / Drive will ramp to stop at rate programmed in parameter P2-25 2nd deceleration ramp time.

P2-39 Parameter lock

When locked all parameter changes are prevented ("L" will be displayed)

<u>0 / Disabled</u>

1 / Enabled

P2-40 Extended parameter access code definition

Setting range: 0 – <u>101</u> – 9999

Access to the extended menu (Parameter group 2,3,4,5) is only permitted when the value entered into P1-14 equals that stored in P2-40. In this way, the user may change to code from the standard value of "101' to any desired value.

8.2.4 Parametergroup 3: PID control (Level 2)

P3-01 PID proportional gain

Setting range: <u>0.1</u> – 30.0

PID controller proportional gain. Higher values provide a greater change in drive output frequency in response to small changes in feedback signal. Too high a value can cause instability

P3-02 PID integral time constant

Setting range: 0.0 – <u>1.0</u> – 30.0

PID controller integral time. Larger values provide a more damped response for systems where overall process responds slowly.

P3-03 PID differential time constant

Setting range: <u>0.00</u> – 1.00

P3-04 PID operating mode

<u>0 / Direct operation</u> - Motor speed increases with increase in feedback signal

1 / Inverse Operation - Motor speed decreases with increase in feedback signal.

P3-05 PID reference select

Selects source for PID Reference / Setpoint

<u>0</u> / P3-06 used

1 / Analog input 1 used

2 / Analog input 2 used

P3-06 PID digital reference

Setting range: <u>0.0</u> – 100.0 %

Sets preset digital PID reference / setpoint.

P3-07 PID controller high limit

Setting range: P3-08 – <u>100.0 %</u>

Defines the minimum output value of the PID controller. The lower limit value is calculated as:

Lower Limit = P3-08 × P1-01

P3-08 PID controller low limit

Setting range: <u>0.0 %</u> – P3-07 %

PID controller output high limit. This parameter defines the maximum output value of the PID controller. The upper limit value is calculated as:

Upper Limit = P3-07 × P1-01

A value of 100 % gives the maximum speed limit as is defined in P1-01

P3-09 PID output control

0 / Digital outputs limit - PID output range limited by P3-07 & P3-08

1 / Analog input 1 variable upper limit - PID maximum output limited by the signal applied to Analog input 1.

2 / Analog input 1 variable lower limit - PID minimum output limited by the signal applied to Analog input 1.

3 / PID output + Analog input 1 - PID output is added to the speed reference applied to Analog input 1.

P3-10 PID feedback select

Selects the source of PID feedback signal

0 / Analog input 2

1 / Analog input 1

P3-11 PID error to enable ramps

Setting range: 0.0 – 25.0 %

Defines a threshold PID error level. If the difference between setpoint and feedback values is less than set threshold, internal ramp times of drive are disabled.

Where a greater PID error exists, ramp times are enabled to limit rate of change of motor speed on large PID errors and react quickly to small errors.

P3-12 PID feedback value display scaling factor

Setting range: 0.000 – 50.000

Applies a scaling factor to displayed PID feedback, allowing user to display actual signal level from a transducer, e.g. 0 - 10 Bar etcScaling display value = P3-12 × PID output

P3-13 PID feedback wake-up level

Setting range: 0.0 – 100.0 %

Sets a programmable level. If drive enters standby mode or whilst operating under PID control, selected feedback signal must fall below this threshold before drive will return to normal operation

8.2.5 Parametergroup 4: Motor control (Level 2)

P4-01 Control mode

0/ VFC Speed control

Vector speed control mode for Induction motors with estimated rotor speed feedback control. Field orientated control algorithms are used for motor speed control. Since estimated rotor speed is used to internally close the speed loop, this mode of operation effectively gives closed loop performance without a physical encoder. With a correctly tuned speed controller, steady state speed regulation is typically better then 1 %. An Auto-tune (P4-02) should be carried out prior to first operation to ensure best control.

1/ VFC Torque control

Instead of controlling the motor speed, the motor output torque is controlled directly. In this mode of operation, the output speed is not controlled but will change dependent on load. The maximum speed is limited by P1-01. This mode is often used for winding applications, where a constant torque is required to maintain tension in a cable. An Auto-tune (P4-02) should be carried out prior to first operation to ensure best control.

2/ Speed control - Enhanced V/F

This mode is effectively voltage control, where applied motor voltage is controlled rather than the torque producing current. The magnetising current is controlled directly, so that voltage boost is not required. The Voltage characteristic can be selected using the energy saving function in parameter (P1-06). The default setting gives a linear characteristic, where voltage is proportional to frequency, noting that the magnetising current is independently controlled. By enable the energy saving function it selects a reduced voltage characteristic, where applied motor voltage is reduced at lower speeds. This is typically used for fan applications to save energy consumption. The Auto-tune function should also be called in this mode of operation. In this case, the tuning process is less complex and completes very quickly.

3/ PM Motor speed control

Speed control for Permanent magnet motors. Same properties as VFC speed control

4/ PM Motor torque control

Torque control for Permanent magnet motors. Same properties as VFC torque control

5/ PM Motor position control

Position control for Permanent magnet motors. Speed and torque reference is provided by processdata in Motion Protocol (P1-12=8). An encoder is required.

P4-02 Auto tune

0 / Disable

1 / Enable

When set to "1", drive immediately carries out a static (non-rotating) motor parameter measurement operation to configure motor parameters. P1-07, P1-08 and P1-09 must be set correctly according to motor nameplate before enabling this function.

Auto-tune runs automatically on first enable after parameter default operation and P1-08 have been changed. No hardware enable required.

P4-03 Speed controller Proportional gain

Setting range: 0.1 – 50 – 400 %

Sets proportional gain value for speed controller.Higher values provide better output frequency regulation and response. Too high a value can cause instability or even overcurrent trips. For applications requiring best possible performance:value should be adjusted to suit connected load by gradually increasing value and monitoring actual output speed of load. This process should be continued until required dynamic behaviour achieved with little or no overshoot, where output speed exceeds setpoint.

In general, higher friction loads can tolerate higher values of proportional gain. High inertia, low friction loads may require gain to be reduced.

P4-04 Speed controller Integral time constant

Setting range: 0.001 – 0.100 – 1.000 s

Sets integral time for speed controller. Smaller values provide a faster response in reaction to motor load changes, at risk of introducing instability. For best dynamic performance, value should be adjusted to suit connected load.

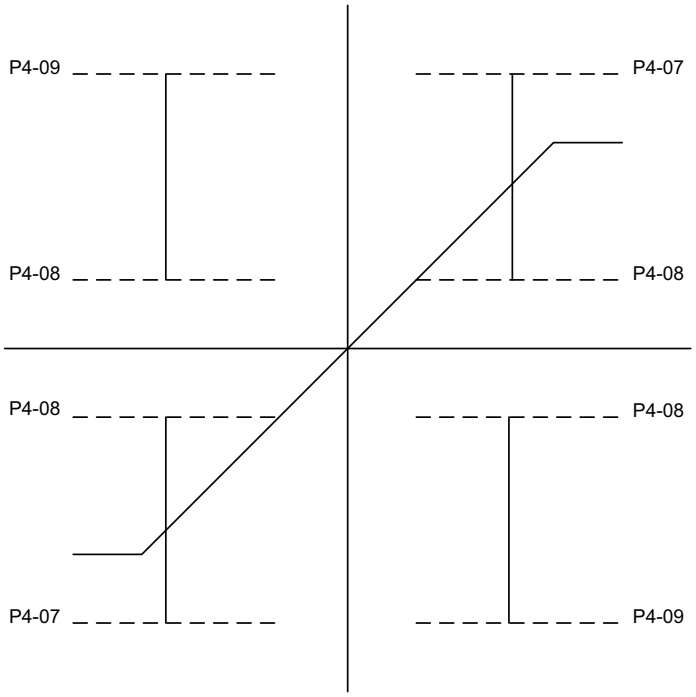
P4-05 Motor power factor

Setting range: 0.50 – 0.99 (drive depending)

Motor nameplate power factor, which must be entered for vector operation (P4-01 = 0 or 1).

P4-06 – P4-09 Motor torque settings

Use this parameters to adjust the motor torque limits.



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P4-06 Torque control reference

When operating in vector mode or PM mode

(P4-01 ≠ 2), this parameter selects source of torque reference / limit.

0 / Maximum torque limit

Fixed Preset torque limit. Torque reference is preset by P4-07. If this option is used, the motor output torque reference value will be fixed by the percentage value of motor rated torque set in parameter P4-07. The motor rated torque is determined automatically by the auto-tune.

1/ Analog Input 1

2 / Analog input 2

Analog input torque limit. If a variable torque reference is required, the analog input can be used as the torque reference. In this case, the reference value could be changed in real time in proportion to the analog input signal. The correct analog input signal format should be set in parameter P2-30/P2-33. The input signal format must be unipolar. Bipolar references are not supported for a torque limit. The scaling depends on the value set in P4-07. (0 – 10 V = 0 – P4-07 % torque).

Analog Input 2

3/ Modbus Communication

Modbus torque reference. When this option is selected, the motor torque limit is given by the Modbus master. The value can range from 0 % to 200 %.

4/ Master drive

Master drive in a Master/Slave network provides the torque reference.

5/ PID output

The output of the PID controller provides the torque reference.

P04-07 Maximum motoring torque limit

Setting range: P4-08 – 200 – 500 %

If P4-01 = 1 or 4 and P4-06 = 0, sets preset torque reference. If P4-01 = 0 or 3, sets maximum torque limit. The torque limit is based on the output current set by parameter P1-08.

P4-08 Minimum torque limit

Setting range: 0.0 – P4-07 %

Sets minimum torque limit. Drive will attempt to maintain this torque on motor at all times during operation.

NOTE: This parameter should be used with extreme care because drive output frequency will increase (to achieve torque level) and may exceed selected speed reference.

P4-09 Maximum regenerating torque limit

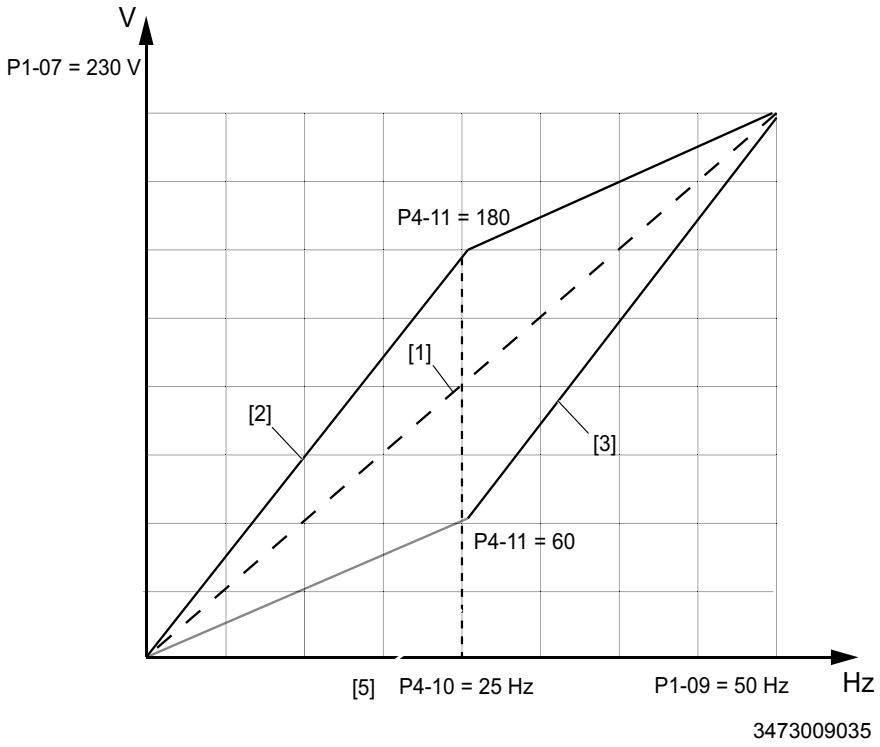
Setting range: P4-08 – 200 – 500 %

Defines the control current limit when in regenerating mode. The value in this parameter represents the percentage value of motor rated current that is defined in P1-08. The current limit that defined in this parameter will override the normal torque producing current limit when motor goes into regeneration mode. Too high a value may cause big motor current distortion and the motor may behavior aggressively once motor goes into regeneration mode. The output torque of the motor may reduce during regeneration if the value in this parameter too small

P4-10/11 V/F characteristing settings

The Voltage - Frequency characteristic defines the level of voltage that is applied to the motor at any given frequency. Parameters P4-10 and P4-11 allows the user to modify the V/F characteristic should this be required.

Parameter P4-10 can be set to any frequency between 0 and the base frequency (P1-09) and represents the frequency at which the percentage adjustment level set in P4-11 is applied. Note that this function is only active when P4-01=2



[1] Normal V/F characteristic
[2] Adjusted V/F characteristic
[3] Adjusted V/F characteristic

P4-10 V/F characteristic adjustment frequency

Setting range: 0.0 – 100.0 % of P1-09

P4-11 V/F characteristic adjustment voltage

Setting range: 0.0 – 100.0 % of P1-07

P4-12 Motor brake control

Enables the global brake control of the drive.

Parameters P4-13 to P4-16 become active.

Relay contact 2 is set to hoist and the function cannot be changed.

0 / Disabled /

1 / Enabled

P4-13 Motor brake release time

Setting range: 0.0 – 0.2 – 5.0 s

This parameter determines how long the motor will remain at preset speed 7 speed after successful premagnetisation of the motor and brake has to release.

P4-14 Motor brake apply time

Setting range: 0.0 – 5.0 s

This parameter can be used to set the time required for the mechanical brake to apply. This parameter prevents a sagging of the drive especially for hoists.

P4-15 Torque threshold for brake release

Setting range: 0.0 – 1.0 – 200 %

Sets the torque level in % of maximum available that must be generated prior to release of the motor brake.

This is used to ensure that the motor is connected and the torque generated to prevent the load dropping when the brake is released. In V/F mode the torque prove is not active. This is only recommended for horizontal moving applications.

P4-16 Torque threshold timeout

Setting range: 0.0 – 5.0 s

sets the time for which following a start command, the drive will attempt to apply enough torque to the motor to reach the torque threshold for brake release level set in Parameter P4-15. Should the torque level not be reached within the set time, due to a mechanical or other fault, the drive will trip.

8.2.6 Parametergroup 5: Fieldbus communications (Level 2)

P5-01 Drives address

Setting range: 1 – 63

Sets the global drive address for Sbus, Modbus, Filedbus and Master/Slave

P5-02 SBus baudrate

Sets the Sbus baudrate. This parameter must be set to operate for SEW gateways or MoviPLC.

125 / 125 kBaud

250 / 250 kBaud

500 / 500 kBaud

1000 / 1000 kBaud

P5-03 Modbus baudrate

Sets the expected Modbus baudrate

9.6 / 9600 baud

19.2 / 19200 baud

38.4 / 38400 baud

57.6 / 57600 baud

115.2 / 115200 baud

P5-04 Modbus data format

Sets the expected Modbus data format

n-1 / No parity, 1 stop bit

n-2 / No parity, 2 stop bits

O-1 / Odd parity, 1 stop bit

E-1 / Even parity, 1 stop bit

P5-05 Communication loss action

Controls behavior of drive following a loss of communications after timeout time set in P5-06.

0 / Trip and coast to stop

1 / Ramp to stop and trip

2 / Ramp to stop (no trip)

3 / Preset speed 8

P5-06 Communication loss timeout

Setting range: 0.0 – 1.0 – 5.0 s

Sets the time in seconds after the drive will apply action as set in P5-05. If set to 0.0s the drive will hold actual speed even if the communication is lost.

P5-07 Ramps set via SBus

Allow the user to enable the internal or external ramp control. If enabled the drive will follow the external ramps sent by Movilink processdata (PO3).

0 / Disabled

1 / Enabled

P5-08 Sync. Cyclic period

Setting range: 0, 5 – 10 ms

Sets the period of the sync message of the MoviPLC. This value must be equal to the value as set in the MoviPLC. If P5-08=0 the drive doesn't care about the sync.

8.2.7 P1-15 Digital inputs function select

The functionality of the digital inputs within the MOVITRAC® LTP-B is user programmable, allowing the user to select the functions required for the application.

The following tables define the functions of the digital inputs depending on the value of parameter *P1-12 (Terminal / Keypad / SBus control)* and *P1-15 (Digital input function select)*.

Frequency inverter mode

P1-15	Digital input 1	Digital input 2	Digital input 3	Analog input 1	Analog input 2	Comments / Preset value
1	O: Stop (Disable) C: Run (Enable)	O: Forward C: Reverse	O: Selected speed ref C: Preset speed 1, 2	Analog 1 speed ref	O: Preset speed 1 C: Preset speed 2	–
2	O: Stop (Disable) C: Run (Enable)	O: Forward C: Reverse	Open	Open	Open	Preset speed 1
			Closed	Open	Open	Preset speed 2
			Open	Closed	Open	Preset speed 3
			Closed	Closed	Open	Preset speed 4
			Open	Open	Closed	Preset speed 5
			Closed	Open	Closed	Preset speed 6
			Open	Closed	Closed	Preset speed 7
			Closed	Closed	Closed	Preset speed 8
3	O: Stop (Disable) C: Run (Enable)	O: Forward C: Reverse	O: Selected speed ref C: Preset speed 1	Analog 1 speed ref	Analog torque ref	–
4	O: Stop (Disable) C: Run (Enable)	O: Forward C: Reverse	O: Selected speed ref C: Preset speed 1	Analog 1 speed ref	O: Decel ramp 1 C: Decel ramp 2	–
5	O: Stop (Disable) C: Run (Enable)	O: Forward C: Reverse	O: Selected speed ref C: Analog input 2	Analog 1 speed ref	Analog 2 speed ref	–
6	O: Stop (Disable) C: Run (Enable)	O: Forward C: Reverse	O: Selected speed ref C: Preset speed 1	Analog 1 speed ref	External trip[1)] O: trip C: Run	–
7	O: Stop (Disable) C: Run (Enable)	O: Forward C: Reverse	Open	Open	External trip[1)] O: trip C: Run	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4
8	O: Stop (Disable) C: Run (Enable)	O: Forward C: Reverse	Open	Open	O: Decel ramp 1 C: Decel ramp 2	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4
9	O: Stop (Disable) C: Run (Enable)	O: Forward C: Reverse	Open	Open	O: Selected speed ref C: Preset speed 1 – 4	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4
10	O: Stop (Disable) C: Run (Enable)	O: Forward C: Reverse	Normally Open (N.O.) Close to increase speed	Normally Open (N.O.) Close to reduce speed	O: Selected speed ref C: Preset speed 1	–
11	O: Stop (Disable) C: Run forward	O: Stop (Disable) C: Run reverse	O: Selected speed ref C: Preset speed 1, 2	Analog 1 speed ref	O: Preset speed 1 C: Preset speed 2	–

P1-15	Digital input 1	Digital input 2	Digital input 3	Analog input 1	Analog input 2	Comments / Preset value
12	O: Stop (Disable) C: Run forward	O: Stop (Disable) C: Run reverse	Open	Open	Open	Preset speed 1
			Closed	Open	Open	Preset speed 2
			Open	Closed	Open	Preset speed 3
			Closed	Closed	Open	Preset speed 4
			Open	Open	Closed	Preset speed 5
			Closed	Open	Closed	Preset speed 6
			Open	Closed	Closed	Preset speed 7
			Closed	Closed	Closed	Preset speed 8
13	O: Stop (Disable) C: Run forward	O: Stop (Disable) C: Run reverse	O: Selected speed ref C: Preset speed 1	Analog 1 speed ref	Analog torque ref	–
14	O: Stop (Disable) C: Run forward	O: Stop (Disable) C: Run reverse	O: Selected speed ref C: Preset speed 1	Analog 1 speed ref	O: Decel ramp 1 C: Decel ramp 2	–
15	O: Stop (Disable) C: Run forward	O: Stop (Disable) C: Run reverse	O: Selected speed ref C: Analog input 2	Analog 1 speed ref	Analog 2 speed ref	–
16	O: Stop (Disable) C: Run forward	O: Stop (Disable) C: Run reverse	O: Selected speed ref C: Preset speed 1	Analog 1 speed ref	External trip[1)] O: trip C: Run	–
17	O: Stop (Disable) C: Run forward	O: Stop (Disable) C: Run reverse	Open	Open	External trip[1)] O: trip C: Run	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4
18	O: Stop (Disable) C: Run forward	O: Stop (Disable) C: Run reverse	Open	Open	O: Decel ramp 1 C: Decel ramp 2	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4
19	O: Stop (Disable) C: Run forward	O: Stop (Disable) C: Run reverse	Open	Open	O: Selected speed ref C: Preset speed 1 – 4	Preset speed 1
			Closed	Open		Preset speed 2
			Open	Closed		Preset speed 3
			Closed	Closed		Preset speed 4
20	O: Stop (Disable) C: Run forward	O: Stop (Disable) C: Run reverse	Normally Open (N.O.) Close to increase speed	Normally Open (N.O.) Close to reduce speed	O: Selected speed ref C: Preset speed 1	Used for motor potentiometer operation
21	O: Stop (Disable) C: Run forward (latch)	O: Stop (Disable) C: Run	O: Stop (Disable) C: Run reverse (latch)	Analog 1 speed ref	O: Selected speed ref C: Preset speed 1	Function activated when *P1-12* = 0

1) External trip is defined in parameter *P2-33*.

INFORMATION

- Parameter P1-15 also has the entry "0", which represents the same function as the last selected entry. When using a controller from SEW-EURODRIVE the input functions may vary according to the drive's internal selections.

Speed reference selection

The "Selected speed reference" referred to in the previous chapter is determined by the value set in *P1-12* (Terminal / keypad / SBus control).

P1-12 (Terminal / keypad / SBus control)		Digital input 2
0	Terminal mode	Analog input 1
1	Keypad mode (uni-directional)	Digital potentiometer
2	Keypad mode (bi-directional)	Digital potentiometer
3	User PID mode	PID controller output
4	Slave mode	Speed reference via Optibus
5	SBus (MOVILINK® protocol)	Speed reference via SBus
6	CANbus	Speed reference via CANbus
7	Modbus	Speed reference via Modbus
8	SBus (MOVI-PLC® Motion Protocol)	Speed reference via SBus

8.2.8 Hoist function

To enable the hoist function *P4-12* (motor brake control) must be set to "1". When the hoist function is enabled all necessary parameters to operate in hoist mode are activated and locked. These parameters are:

- Relay contact
- Brake release delay
- Brake apply delay
- Preset speed 7 becomes brake release speed
- Preset speed 8 becomes brake apply speed
- Brake chopper enabled

INFORMATION

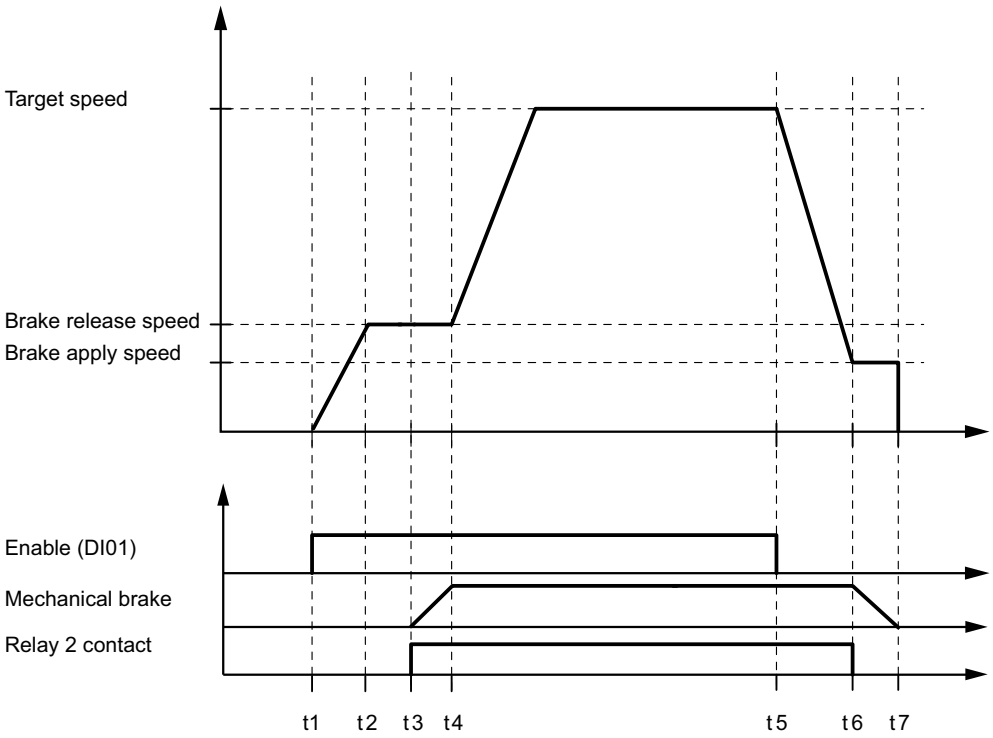
- A single-phase motor phase failure cannot always be detected reliably.
- The correct performance of the hoist function requires the motor brake to be controlled via the drive.

General settings

- Clockwise corresponds to the direction upwards.
- Counterclockwise corresponds to the direction downwards.
- For a change in direction the motor has to be stopped (brake closed). Disable must be applied before the direction can be changed.

Hoist mode operation

The following diagram shows the operation in hoist mode.



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t_1	Drive enable signal
t_1-t_2	Motor ramps up to brake release speed (preset speed 7)
t_2	Brake release speed reached
t_2-t_3	Torque threhold (*P4-15*) is proofed. If the torque level is not reached with the torque threshold time (*P4-16*) the drive trips.
t_3	Relay opens
t_3-t_4	Brake release within brake release time (*P4-13*)
t_4	Brake is open and drive will ramp up to target speed
t_4-t_5	Normal operation
t_5	Drive disable signal
t_5-t_6	Drive ramps down to brake apply speed (preset speed 8)
t_6	Relay closes
t_5-t_6	Brake closes within brake apply time (*P4-14*)
t_7	Brake is closed and drive is in stop mode

9 Software

9.1 Modbus control

9.1.1 Specification

The following table highlights the specification for the Modbus RTU implementation in MOVITRAC® LTP-B.

Protocol	Modbus RTU
Error check	CRC
Baud rate	9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps (default)
Data format	1 start bit, 8 data bits, 1 stop bit, no parity
Physical signal	RS-485 (2-wire)
User interface	RJ45

9.1.2 Memory map

Register	Upper byte	Lower byte	Command	Type
1	Command	–	03, 06	Read / Write
2	Speed reference	–	03, 06	Read / Write
3	Torque reference	–	03, 06	Read / Write
4	Acceleration ramp time	Deceleration ramp time	03, 06	Read / Write
5	Reserved	–	03	Read only
6	Error code	Drive status	03	Read only
7	Motor speed	–	03	Read only
8	Motor current	–	03	Read only
9	Motor torque	–	03	Read only
10	Motor power	–	03	Read only
11	Digital input status	–	03	Read only

9.1.3 Register description

Type	Register number	Register title	Description	
Read / Write	1	Drive command	0: CMD	Drive command setup: 00: stop 01: start 10: reset
			1: CMD	
			2: 2nd	2nd deceleration ramp select flag
			3 – 15: Reserved	Reserved
	2	Speed reference setup	This register holds the speed reference value to 1 decimal place (200 = 20.0 Hz). The maximum speed reference value is limited by *P1-01*.	
	3	Torque reference setup	This register holds the torque reference to 1 decimal place (450 = 45.0 %). The data range is from 0 (0 %) to 2000 (200.0 %). This torque reference is only active when *P4-06* = 3 and the drive is in vector control mode.	
	4	Acceleration / deceleration ramp setup	Low byte: Acceleration ramp time High byte: Deceleration ramp time (Range: 0 – 255)	-0M-version
			Controls acceleration and deceleration time simultaneously. (Range: 0 – 6000)	-00-version
			Ramp time in seconds × 10 (e.g. 100 = 10.0 s)	
Read only	6	Drive status and error code	High byte gives the drive error code (valid when the drive is tripped). Low byte gives the drive status: 0: drive stopped 1: drive running 2: drive tripped	
	7	Motor speed information	This register gives motor speed information. The data is in Hz and to 1 decimal place (e.g. 234 = 23.4 Hz).	
	8	Motor current	This register gives motor current information. The data is in Amps to 1 decimal place (e.g. 87 = 8.7 A).	
	9	Motor torque	This register gives motor output torque information. It is a percentage value as 100.0 % equals motor rated torque. The data value is stated to 1 decimal place.	
	10	Motor power	This register gives motor power information and the data is stated to 2 decimal places (e.g. 124 = 1.24 kW / HP). The data unit depends on the drive type.	
	11	Digital input status	The value in this register represents the drive terminal digital input status (digital input 1 – 4). The lowest bit indicates digital input status 1.	

9.1.4 Internal values

For some speed related parameters the drive uses an internal value instead of the actual speed in Hz in order to increase the resolution. In order to set these speed related parameters correctly, the internal value must be used instead of the display value.

Speed Internal = Speed in Hz × Factor

When *P1-09* ≤ 100 Hz	Factor = 60	e.g. 30.5 Hz = 1830
When *P1-09* is 101 – 199 Hz	Factor = 30	e.g. 30.5 Hz = 915
When *P1-09* ≥ 200 Hz	Factor = 15	e.g. 250 Hz = 3750

Dataflow example

Modbus RTU read data from register 6:

Request	[01] Drive address	[03] Command	[00] [05] Register start address	[00] [01] Number of registers	[94] [0B] Checksum
Reply	[01] Drive address	[03] Command	[02] Number of data bytes	[00] [00] Data	[B8] [44] Checksum

Please note that the start address for register 6 is "5".

10 Technical Data MOVITRAC® LTP-B

10.1 Conformance

All products conform to the following international standards:

- CE marked for low voltage directive
- IEC 664-1 Insulation coordination within low voltage systems
- UL 508C Power conversion equipment
- EN 61800-3 Adjustable speed electrical power drive systems – Part 3
- EN 61000-6 / -2, -3, -4 Generic immunity / Emission standards (EMC)
- Enclosure protection level according to NEMA 250, EN 60529
- Flammability rating according to UL 94
- C-Tick
- cUL

10.2 Environmental

Operational ambient temperature range	–10 °C to +50 °C at default PWM frequency (IP20) –10 °C to +40 °C at default PWM frequency (IP55, NEMA 12k / IP66, NEMA 4X)
Maximum ambient temperature derating	4 % / °C up to 55 °C for IP20 drives 4 % / °C up to 45 °C for IP55 / IP66 drives
Storage ambient temperature range	–40 °C to +60 °C
Maximum altitude for rated operation	1000 m
Derating above 1000 m	1 % / 100 m to max. 2000 m
Maximum relative humidity	95 % (non-condensing)
Protection rating of standard drive housing	IP20
Higher protection rating of drive enclosure	IP55, NEMA 12 k / IP66, NEMA 4X

10.3 Output power and current ratings

10.3.1 1-phase system AC 230 V for 3-phase AC 230 V motors

MOVITRAC® LTP-B – EMC filter class B					
IP20 Standard with filter[1]	Type	MC LTP B...	0008-2B1-4-00	0015-2B1-4-00	0022-2B1-4-00
	Part number		18251382	18251528	18251641
IP55 / NEMA 12 housing with filter	Type	MC LTP B...	0008-2B1-4-10	0015-2B1-4-10	0022-2B1-4-10
	Part number		18251390	18251536	18251668
IP55 / NEMA 12 housing with switch and filter	Type	MC LTP B...	0008-2B1-4-20	0015-2B1-4-20	0022-2B1-4-20
	Part number		18251404	18251544	18251676
INPUT					
Supply voltage		V_{mains}	1 × AC 200 – 240 V ± 10 %		
Supply frequency		f_{mains}	50 / 60 Hz ± 5 %		
Supply fuse rating		A	16	20	32 (35)[2]
Nominal input current		A	10.5	16.2	23.8
OUTPUT					
Recommended motor power		kW	0.75	1.5	2.2
		hp	1.0	2.0	3
Output voltage		V_{motor}	3 × 20 – 250 V		
Output current		A	4.3	7	10.5
Motor cable size Cu 75C		mm^2	1.5		
		AWG	16		
Max. motor cable length	Shielded	m	100		
	Unshielded		150		
GENERAL					
Size			2		
Heat loss at nominal output power		W	45		66
Min. braking resistor value		Ω	47		

1) Unit for Europe, Australia & New Zealand

2) Recommended value for UL compliance

10.3.2 3-phase system AC 230 V for 3-phase AC 230 V motors

Sizes 2 & 3

MOVITRAC® LTP-B – EMC filter class A								
IP20 Standard with filter[1]	Type	MC LTP B...	0008-2A3-4-00	0015-2A3-4-00	0022-2A3-4-00	0030-2A3-4-00	0040-2A3-4-00	0055-2A3-4-00
	Part number		18251358	18251471	18251617	18251722	18251765	18251846
IP55 / NEMA 12 housing with filter[1]	Type	MC LTP B...	0008-2A3-4-10	0015-2A3-4-10	0022-2A3-4-10	0030-2A3-4-10	0040-2A3-4-10	0055-2A3-4-10
	Part number		18251366	18251498	18251625	18251730	18251773	18251854
IP55 / NEMA 12 housing with switch and filter[1]	Type	MC LTP B...	0008-2A3-4-20	0015-2A3-4-20	0022-2A3-4-20	0030-2A3-4-20	0040-2A3-4-20	0055-2A3-4-20
	Part number		18251374	18251501	18251633	18251749	18251781	18251862
INPUT								
Supply voltage		V_{mains}	3 × AC 200 – 240 V ± 10 %					
Supply frequency		f_{mains}	50 / 60 Hz ± 5 %					
Supply fuse rating		A	10	10	16	32 (35)[2]		50
Nominal input current		A	5.7	8.4	13.1	16.1	20.7	25
OUTPUT								
Recommended motor power		kW	0.75	1.5	2.2	3	4	5.5
		hp	1.0	2.0	3.0	4.0	5.4	7.4
Output voltage		V_{motor}	3 × 20 – 250 V					
Output current		A	4.3	7	10.5	14	18	24
Motor cable size Cu 75C		mm^2	1.5		2.5			4
		AWG	16		12			10
Max. motor cable length	Shielded	m	100					
	Unshielded		150					
GENERAL								
Size			2			3		
Heat loss at nominal output power		W	45		66	90	120	165
Min. braking resistor value		Ω	47					

1) Unit for Europe, Australia & New Zealand

2) Recommended value for UL compliance

10.3.3 3-phase system AC 400 V for 3-phase AC 400 V motors

Sizes 2 & 3

MOVITRAC® LTP-B – EMC filter class A									
IP20-Standard [1]	Type	MC LTP B...	0008-5A3-4-00	0015-5A3-4-00	0022-5A3-4-00	0040-5A3-4-00	0055-5A3-4-00	0075-5A3-4-00	0110-5A3-4-00
	Part number		18251412	18251552	18251684	18251803	18251870	18251927	18251986
IP55 / NEMA 12 housing [1]	Type	MC LTP B...	0008-5A3-4-10	0015-5A3-4-10	0022-5A3-4-10	0040-5A3-4-10	0055-5A3-4-10	0075-5A3-4-10	0110-5A3-4-10
	Part number		18251420	18251560	18251692	18251811	18251889	18251935	18251994
IP55 / NEMA 12 with switch [1]	Type	MC LTP B...	0008-5A3-4-20	0015-5A3-4-20	0022-5A3-4-20	0040-5A3-4-20	0055-5A3-4-20	0075-5A3-4-20	0110-5A3-4-20
	Part number		18251439	18251579	18251706	18251838	18251897	18251943	18252001
INPUT									
Supply voltage		V_{mains}	3 × AC 380 – 480 V ± 10 %						
Supply frequency		f_{mains}	50 / 60 Hz ± 5 %						
Supply fuse rating		A	6	10	16	16 (15) [2]	20	25	32 (35) [2]
Nominal input current		A	3.1	4.8	7.2	10.8	17.6	22.1	28.2
OUTPUT									
Recommended motor power		kW	0.75	1.5	2.2	4	5.5	7.5	11
		hp	1	2	3	5.4	7.4	10.1	14.8
Output voltage		V_{motor}	3 × 20 – 250 V						
Output current		A	2.2	4.1	5.8	9.5	14	18	24
Motor cable size Cu 75C		mm^2	1.5		2.5				4
		AWG	16		12				10
Max. motor cable length	Shielded	m	100						
	Unshielded		150						
GENERAL									
Size			2				3		
Heat loss at nominal output power		W	22	45	66	120	165	225	330
Min. braking resistor value		Ω	100				22		

1) Unit for Europe, Australia & New Zealand

2) Recommended value for UL compliance

11 Address List

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 • D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Production / Industrial Gears	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Christian-Pähr-Str.10 D-76646 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-2970
Service Competence Center	**Central**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte@sew-eurodrive.de
	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-elektronik@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54 route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Production	**Forbach**	SEW-USOCOME Zone industrielle Technopôle Forbach Sud B. P. 30269 F-57604 Forbach Cedex	Tel. +33 3 87 29 38 00
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15
	Nantes	SEW-USOCOME Parc d'activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20

France			
	Paris	SEW-USOCOME Zone industrielle 2 rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Alger**	REDUCOM Sarl 16, rue des Frères Zaghnoune Bellevue 16200 El Harrach Alger	Tel. +213 21 8214-91 Fax +213 21 8222-84 info@reducom-dz.com http://www.reducom-dz.com

Argentina			
Assembly **Sales** **Service**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://www.sew-eurodrive.at sew@sew-eurodrive.at

Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 17 298 47 56 / 298 47 58 Fax +375 17 298 47 54 http://www.sew.by sales@sew.by

Belgium			
Assembly **Sales** **Service**	**Brussels**	**SEW Caron-Vector** Research park Haasrode Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be
Service Competence Center	**Industrial Gears**	**SEW Caron-Vector** Rue de Parc Industriel, 31 BE-6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-wallonie@sew-eurodrive.be
	Antwerp	**SEW Caron-Vector** Glasstraat, 19 BE-2170 Merksem	Tel. +32 3 64 19 333 Fax +32 3 64 19 336 http://www.sew-eurodrive.be service-antwerpen@sew-eurodrive.be

Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 152 - Rodovia Presidente Dutra Km 208 Guarulhos - 07251-250 - SP SAT - SEW ATENDE - 0800 7700496	Tel. +55 11 2489-9133 Fax +55 11 2480-3328 http://www.sew-eurodrive.com.br sew@sew.com.br

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@mail.bg

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 33 431137 Fax +237 33 431137 electrojemba@yahoo.fr

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, ON L6T 3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.watson@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. Tilbury Industrial Park 7188 Honeyman Street Delta, BC V4G 1G1	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Lasalle, PQ H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 info@sew-eurodrive.cn http://www.sew-eurodrive.com.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267922 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478388 Fax +86 27 84478389 wuhan@sew-eurodrive.cn

China			
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 xian@sew-eurodrive.cn
	Additional addresses for service in China provided on request!		

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sewcol@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. Zeleni dol 10 HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr

Czech Republic			
Sales	**Prague**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 255 709 601 Fax +420 220 121 237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Copenhagen**	SEW-EURODRIVEA/S Geminivej 28-30 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Egypt			
Sales **Service**	**Cairo**	Copam Egypt for Engineering & Agencies 33 El Hegaz ST, Heliopolis, Cairo	Tel. +20 2 22566-299 + 1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Production **Assembly**	**Karkkila**	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	ESG Electro Services Gabun Feu Rouge Lalala 1889 Libreville Gabun	Tel. +241 741059 Fax +241 741059 esg_services@yahoo.fr

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate P.O. Box No.1 Normanton, West-Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk

Greece			
Sales **Service**	**Athens**	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

India			
Registered Office **Assembly** **Sales** **Service**	**Vadodara**	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200, +91 265 2831086 Fax +91 265 3045300, +91 265 2831087 http://www.seweurodriveindia.com sales@seweurodriveindia.com subodh.ladwa@seweurodriveindia.com
Assembly **Sales** **Service**	**Chennai**	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 c.v.shivkumar@seweurodriveindia.com

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie http://www.alperton.ie

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il

Italy			
Assembly **Sales** **Service**	**Solaro**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Société industrielle & commerciale pour l'Afrique 165, Boulevard de Marseille 26 BP 1115 Abidjan 26	Tel. +225 21 25 79 44 Fax +225 21 25 88 28 sicamot@aviso.ci

Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373855 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp

Kazakhstan			
Sales	**Almaty**	ТОО "СЕВ-ЕВРОДРАЙВ" пр.Райымбека, 348 050061 г. Алматы Республика Казахстан	Тел. +7 (727) 334 1880 Факс +7 (727) 334 1881 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.com info@alas-kuul.com

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
Jordan Kuwait Saudi Arabia Syria	**Beirut**	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 info@medrives.com http://www.medrives.com

Lithuania			
Sales	**Alytus**	UAB Irseva Statybininku 106C LT-63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brussels**	**SEW Caron-Vector** Research park Haasrode Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Quéretaro**	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Morocco			
Sales	**Casablanca**	Afit Route D'El Jadida KM 14 RP8 Province de Nouaceur Commune Rurale de Bouskoura MA 20300 Casablanca	Tel. +212 522633700 Fax +212 522621588 fatima.haquiq@premium.net.ma http://www.groupe-premium.com

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Pakistan			
Sales	**Karachi**	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 676 53 00 Fax +48 42 676 53 45 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	24 Hour Service		Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucharest**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sentoo.sn http://www.senemeca.com

Serbia			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor SCG-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	Žilina	SEW-Eurodrive SK s.r.o. Industry Park - PChZ ulica M.R.Štefánika 71 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za info@sew.co.za

South Africa			
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 cfoster@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaco Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za

South Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442 00 Fax +46 36 3442 80 http://www.sew-eurodrive.se jonkoping@sew.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 4419164 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

Ukraine			
Sales **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

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Sales **Service**	**Sharjah**	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah	Tel. +971 6 5578-488 Fax +971 6 5578-499 copam_me@eim.ae

USA			
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	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
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Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net

Vietnam			
Sales	**Ho Chi Minh City**	Nam Trung Co., Ltd 91 - 93 Tran Minh Quyen Street, District 10, HCMC	Tel. +84 8 8301026 Fax +84 8 8392223 namtrungco@hcm.vnn.vn

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